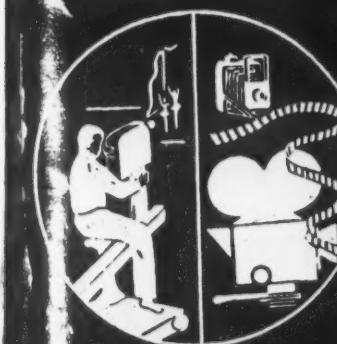
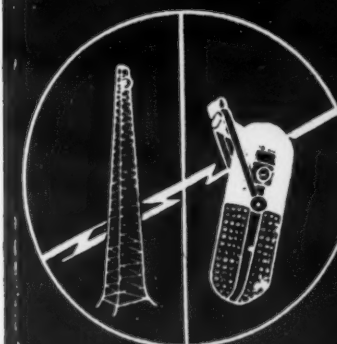
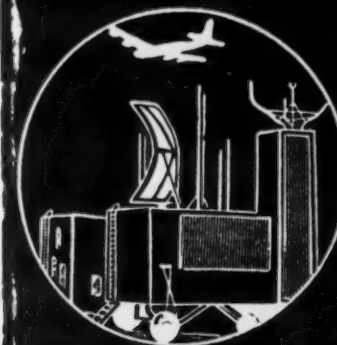
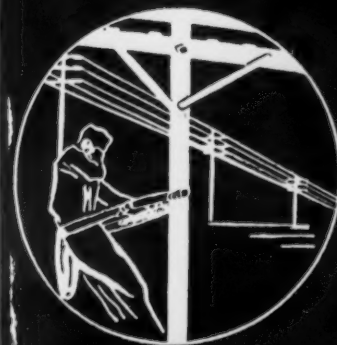


July-August 1955

Communications—Electronics—Photography

SIGNAL



National President George W. Bailey presents
the AFCEA Annual Award at West Point

MINIATURIZED TRANSFORMER COMPONENTS FROM STOCK

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HERMETIC SUB-MINIATURE AUDIO UNITS

These are the smallest hermetic audios made.

Dimensions . . . 1/2 x 11/16 x 29/32 . . . Weight .8 oz.



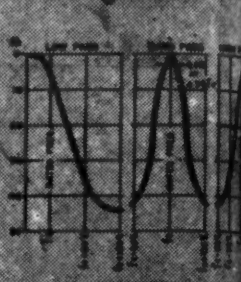
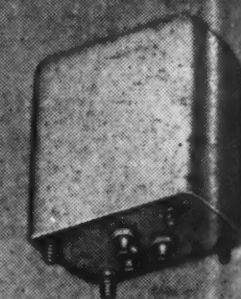
TYPICAL ITEMS

Type No.	Application	MIL Type	Pri. Imp. Ohms	Sec. Imp. Ohms	DC in Pri MA	Response ± 2 db (Cyc.)	Max. level dbm
H-30	Input to grid	TF1A10YY	50*	62,500	0	150-10,000	+13
H-31	Single plate to single grid, 3:1	TF1A15YY	10,000	90,000	0	300-10,000	+13
H-32	Single plate to line	TF1A13YY	10,000*	200	3	300-10,000	+13
H-33	Single plate to low impedance	TF1A13YY	30,000	50	1	300-10,000	+15
H-34	Single plate to low impedance	TF1A13YY	100,000	60	.5	300-10,000	+6
H-35	Reactor	TF1A20YY	100 Henries-0 DC, 50 Henries-1 Ma. DC, 4,400 ohms.				
H-36	Transistor Interstage	TF1A15YY	25,000	1,000	.5	300-10,000	+10

*Can be used with higher source impedances, with corresponding reduction in frequency range and current

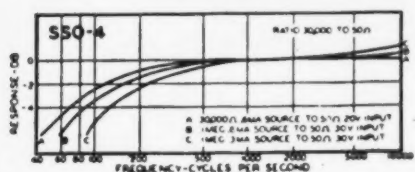
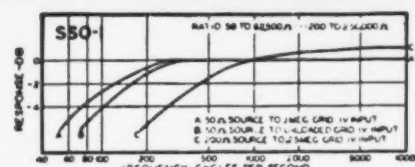
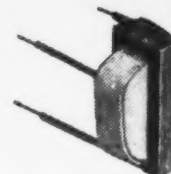
COMPACT HERMETIC AUDIO FILTERS

UTC standardized filters are for low pass, high pass, and band pass application in both inter stage and line impedance designs. Thirty four stock values, others to order. Case 1-3/16 x 1-11/16 x 1-5/8 - 2-1/2 high . . . Weight 6-9 oz.



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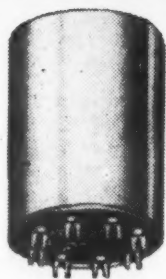


Type	Application	Level	Pri. Imp.	MA D.C. in Pri.	Sec. Imp.	Pri. Res.	Sec. Res.
*SSO-1	Input	+ 4 V.U.	200 50	0	250,000 62,500	13.5	37
SSO-2	Interstage /3:1	+ 4 V.U.	10,000	0-.25	90,000	750	32
*SSO-3	Plate to Line	+20 V.U.	10,000 25,000	3 1.5	200 500	2600	
SSO-4	Output	+20 V.U.	30,000	1.0	50	2875	4
SSO-5	Reactor 50 HY at 1 mil. D.C.						
SSO-6	Output	+20 V.U.	100,000	.5	60	4700	3
*SSO-7	Transistor Interstage	+10 V.U.	20,000 30,000	.5 .5	800 1,200	850	12

* Impedance ratio is fixed, 1250:1 for SSO-1, 1:50 for SSO-3. Any impedance between the values shown may be employed.

SUB-SUBOUNCER (WIDE RANGE) AUDIO UNITS

Standard for the industry for 15 yrs., these units provide 30-20,000 cycle response in a case 7/8 dia. x 1-3/16 high. Weight 1 oz.



TYPICAL ITEMS

Type No.	Application	Pri. Imp	Sec. Imp
0-1	Mike, pickup or line to 1 grid	50, 200/250, 500/600	50,000
0-4	Single plate to 1 grid	15,000	60,000
0-7	Single plate to 2 grids, D.C. in Pri.	15,000	95,000
0-9	Single plate to line, D.C. in Pri.	15,000	50, 200/250, 500/600
0-10	Push pull plates to line	30,000 ohms plate to plate	50, 200/250, 500/600
0-12	Mixing and matching	50, 200/250	50, 200/250, 500/600
0-13	Reactor, 300 Hys.-no D.C.; 50 Hys.-3 MA. D.C., 6000 ohms		

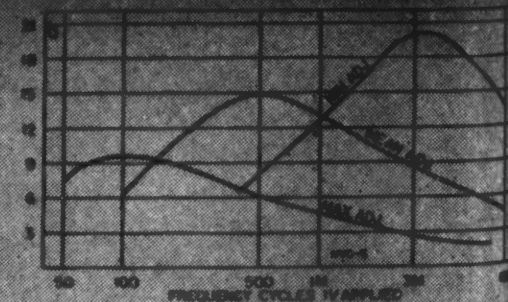
HERMETIC VARIABLE INDUCTORS



These inductors provide high Q from 50-10,000 cycles with exceptional stability. Wide inductance range (10-1) in an extremely compact case 25/32 x 1-1/8 x 1-3/16 . . . Weight 2 oz.

TYPICAL ITEMS

TYPE No.	Min. Hys.	Mean Hys.	Max. Hys.	DC Ma
HVC-1	.002	.006	.02	100
HVC-3	.011	.040	.11	40
HVC-5	.07	.25	.7	20
HVC-6	.2	.6	2	15
HVC-10	7.0	25	70	3.5
HVC-12	50	150	500	1.5



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"It means so much to keep in touch"



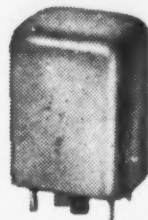
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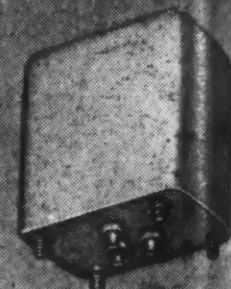
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H-31	Single plate to single grid, 3:1	TF1A15YY	10,000	300,000	0	100-10,000	+13
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H-35	Reactor	TF1A20YY	1	300,000	0	100-10,000	+13
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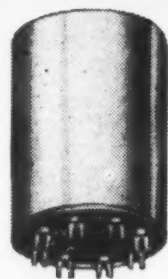
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Date _____ Signature _____

TYPE No.	Reactor	DC in Pri	Mean Hys.	Max. Hys.	DC Ma		
SS0-6	Output	+20 V.U.	100,000	.5	60	4700	35
*SS0-7	Transistor Interstage	+10 V.U.	20,000	.5	800	850	125
			30,000	.5	1,200		

* Impedance ratio is fixed, 1250:1 for SS0-1, 1:50 for SS0-3. Any impedance between the values shown may be employed.



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0-10	Push pull plates to line	30,000 ohms plate to plate	50, 200/250, 500/600
0-12	Mixing and matching	50, 200/250	50, 200/250, 500/600
0-13	Reactor, 300 Hys.—no D.C.; 50 Hys.—3 MA. D.C., 6000 ohms		

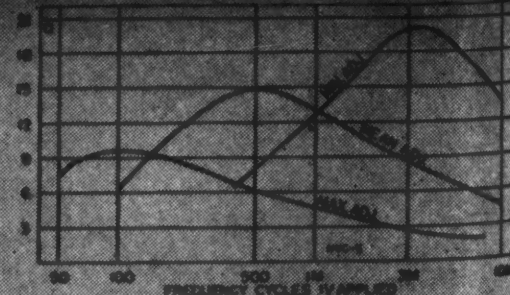


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SIGNAL

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VOLUME 9

JULY-AUGUST 1955

NUMBER 6

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During graduation exercises at West Point, John T. Hamilton received the AFCEA annual award for the graduating cadet who had attained the highest average in courses of electricity. The award, a portable clock-radio donated by the General Electric Company, was presented by AFCEA National President George W. Bailey. For the winner of the award at the Naval Academy, see Association Affairs, page 48.

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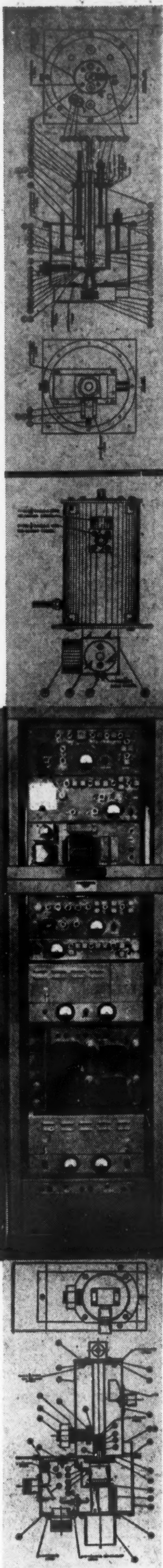
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Memo to SIGNAL Readers:

On a recent New York visit, we dropped in at the Museum of Modern Art to look at Steichen's "Family of Man." Made by both amateur and professional photographers, these records show "man in relation to his environment, to the beauty and richness of the earth he has inherited and what he has done with this inheritance—the good things, the stupid and destructive things." Coming from all parts of the world, the pictures cover a span from the nursery school to a seat in a world conclave.

A retired Navy captain, Steichen served in World War II as chief of the Navy's combat photographic unit. In World War I, he served as director of the photographic division of the aviation section of the Signal Corps. The compilation of the "Family of Man" might well be looked upon as Mr. Steichen's crowning achievement.

The collection will be shown abroad by the U.S. Information Agency and in Washington, D. C. during July at the Corcoran Art Gallery. If you have the opportunity, we sincerely recommend that you do not miss it, or buy the published book version. Here is photography at its best.

As an art form or an historical record, photography can be of interest, value and entertainment in this do-it-yourself period. Mechanization, or automation in the present idiom, and every field of electronics and communications has at its fingertips a tool as versatile as the decimal point.

While we are grasping for knowledge we must use every available tool. It is photography in all its facets and implications that presents results to man in this permanent dimension, as a visual form, a record of his efforts. One form, roentgenology, has been used for years in industry as an aid to locating flaws in castings and metal structures which man's eye cannot penetrate. Photogrammetry, producing its stereoscopic map, has been invaluable in two recent wars. Time-motion studies are best recorded by the camera which catches action far in excess of the 1/30-of-a-second limit which governs human perception.

Continuing in the realm of human aids, the sequence camera, with shutter speeds fast enough to track a bullet, can also capture the phases of an atom explosion or an automobile tire whirling until centrifugal force tears it to shreds. A complete record of a radar or an oscilloscope image can be processed in seconds from a camera which can be carried in a coat pocket. This device requires no light other than that available in the test room.

Problems of future industrial engineer shortages and rapid turnover of trained technicians in the Services may be solved in the near future through photographic and televised adaptations of present teaching methods. Faster learning of more difficult subjects in shorter time has been brought about in test situations in the universities' and Services' technical schools.

In every phase of communications and electronics, in education, research, production, testing and sales, the projected or printed image produced by photography enhances the ability of man to think, to learn, and to produce.

The Editor

Transformers for special applications

Need a transformer for a special or unusual application? Check the qualifications of Caledonia Electronics.

1. **DESIGN EXPERIENCE.** Large staff of design engineers with extensive experience in circuit design—audio, radar, RF, UHF. Engineers who can understand your circuit needs and know how to meet them.

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*Contraves Italiana

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*Industrial Development Engineering Associates, Inc.

Indianapolis, Indiana

†Holtzer-Cabot Division, National Pneumatic Co., Inc.

Boston, Massachusetts

†Microwave Associates, Inc.

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*North Electric Company

Galion, Ohio

†Page Communications Engineers, Inc.

Washington, D. C.

†Technical Materiel Corporation, The

Mamaroneck, New York

* Brief notes about these companies appear on page 50.

† Brief notes about these companies will appear in the September-October issue.

544 new AFCEA individual members from May 1 to July 1

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These cores, fabricated by winding ultra-thin tape of high-permeability magnetic materials on ceramic bobbin cores, possess ideal qualities for use in electronic computer assemblies as memory cells.

Specifically, their desirable properties include quite rectangular hysteresis loops, relatively low coercive values and high saturation densities; plus temperature stability and the ability to shift in a few microseconds from negative remanence to positive saturation, and vice versa, under conditions of pulse excitation.

Arnold Bobbin Cores are available in a wide range of sizes, tape thicknesses, widths and number of wraps to suit the ultimate use of the core. Magnetic materials usually employed are Deltamax, Square Permalloy and Supermalloy, in standard thicknesses of .001", .0005", .00025" and .000125". Special advantages derive from Arnold's position as a fully-integrated producer of wound cores, able to maintain precise control over every production operation . . . melting, rolling, winding, testing, etc.

● *Let us supply your requirements for bobbin cores or any other magnetic materials.*

WAD 5687

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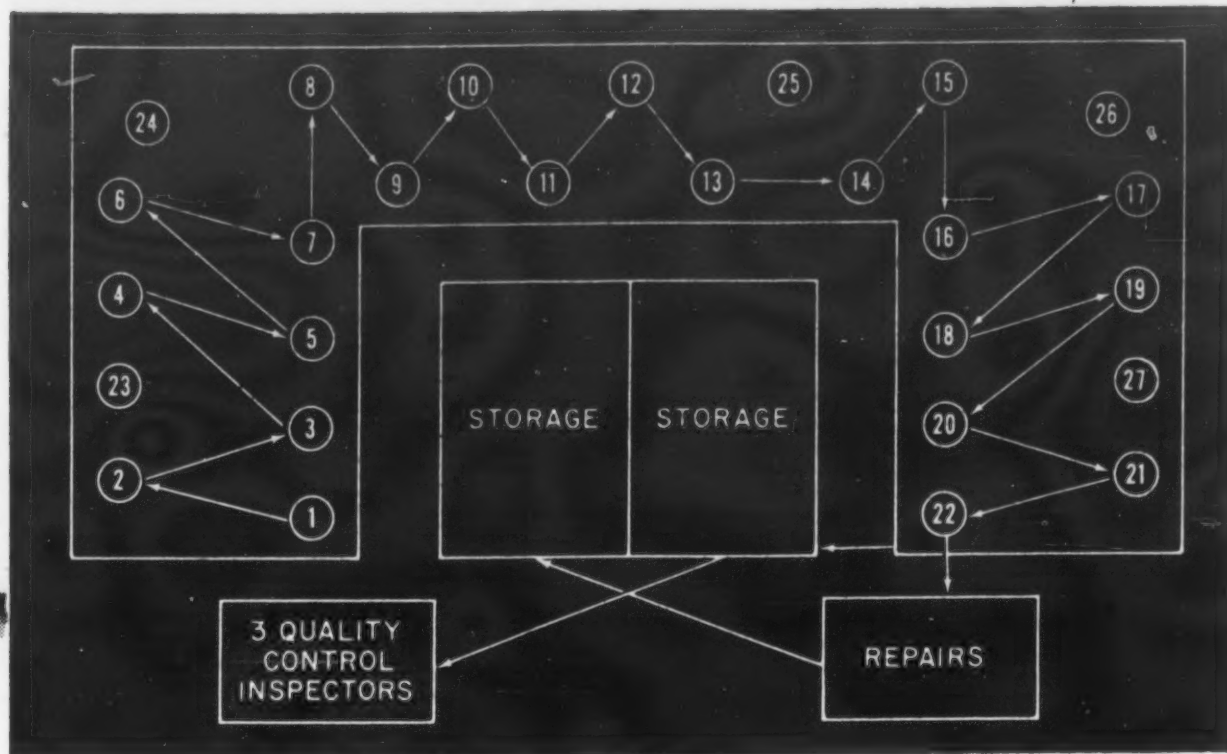
General Office & Plant: Marengo, Illinois

DISTRICT SALES OFFICES . . . New York: 350 Fifth Ave.

Los Angeles: 3450 Wilshire Blvd.

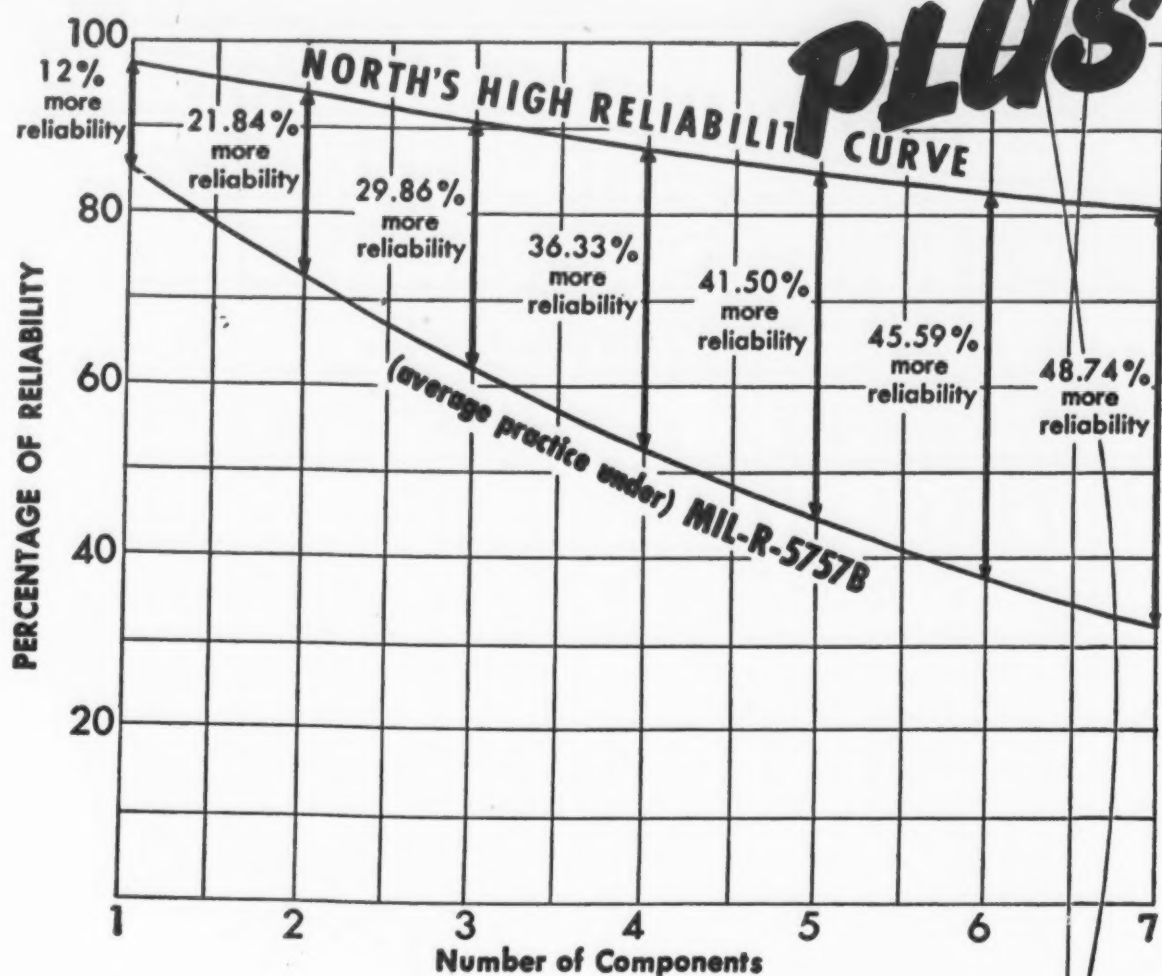
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9

HIGH Reliability



The feedback of results from a new series of tests has enabled North engineers to produce a new high in relay reliability. These relays are especially suited for a wide range of airborne applications where a high degree of shock and vibration immunity is required, and where reliability must exceed the standard resulting from present day practices under MIL-R-5757B.

North's high reliability program subjects each relay to these tests. Comparison of Curves above shows the ratio by which system reliability is reduced in proportion to the number of components employed. Tests prove that the uniformly tight control of the high reliability program developed by North* greatly improves the value of this ratio as applied to North Relays.

Conformity with the pattern which these tests define is your best assurance of reliable system performance.

*Detailed explanation of these tests is available on request.

ACTUAL SIZE

IR 226 RELAY (with cover removed)

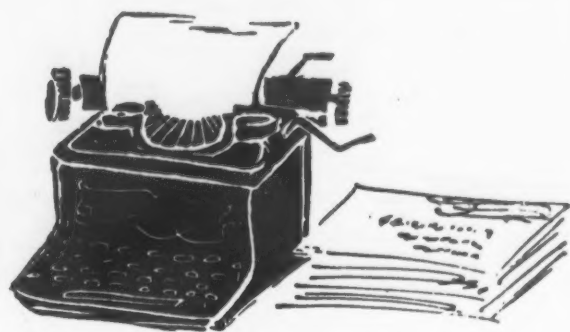
Hermetically Sealed—Sensitive Type—Temperature Range -65° to +125°C—Zero Bounce or Chatter at 50 Gs Shock and 500 Cycle Vibration Tests—2C (two make-break) Contacts—100,000 Operations at Rated Load of 2.0 amps at 30v DC resistive—specifications not applicable to your requirements may be deleted.



**THE NORTH ELECTRIC
MANUFACTURING COMPANY**

INDUSTRIAL DIVISION

563 South Market Street, Galion, Ohio, U.S.A.



Our Readers Write

Global Great, They Say

DEAR SIR:

You and your staff are to be congratulated on the very fine job you did on the May-June issue of SIGNAL. In one compact volume you have made an excellent presentation of our military, other government, and commercial international communication system.

The magazine has been placed in our permanent office file, and I have recommended that it be made required reading for any executive who joins the Communications Division in the future, as a quick survey of the many fields with which he can expect to make contact.

Even my wife, who thinks a waveguide is a fancy name for a breakwater, read most of it from cover to cover and came up with a better than usual non sequitur, to wit, "Well, I finally have some idea of what you've been fiddling around with for the past 23 years!"

KENNETH F. ZITZMAN
Col SigC

Office of the Assistant
Secretary of Defense
(Supply & Logistics)

DEAR SIR:

In the past, your issues of SIGNAL have been truly grand. The May-June issue surpasses any previous issue published and may I give you, as a fellow member, a sincere vote of thanks for your outstanding effort, and a job well done.

HENRY J. HORT
Col SigC

OOPS, SORRY!!!

On page 82 of our May-June issue, the picture of the first telephone dial, used in connection with the Automatic Electric Company story, should have read *Strowger* instead of *Stromberg*. The first telephone dial was developed by the Strowger Automatic Telephone Exchange, predecessor company of Automatic Electric Company, and installed at Albion, New York in 1896. Our apologies to Automatic Electric.

and

The caption for the Montgomery Area Chapter picture on page 72 incorrectly named the third gentleman "Major Wesley C. Royer." The caption should have read "Major John C. Bonson." Our apologies to Maj. Bonson and Lt. Col. Royer.

subminiature, metal-clad

metallized paper capacitors

*Operate at temperatures to 125°C
without voltage derating*

*Withstand dielectric test of twice
rated voltage*

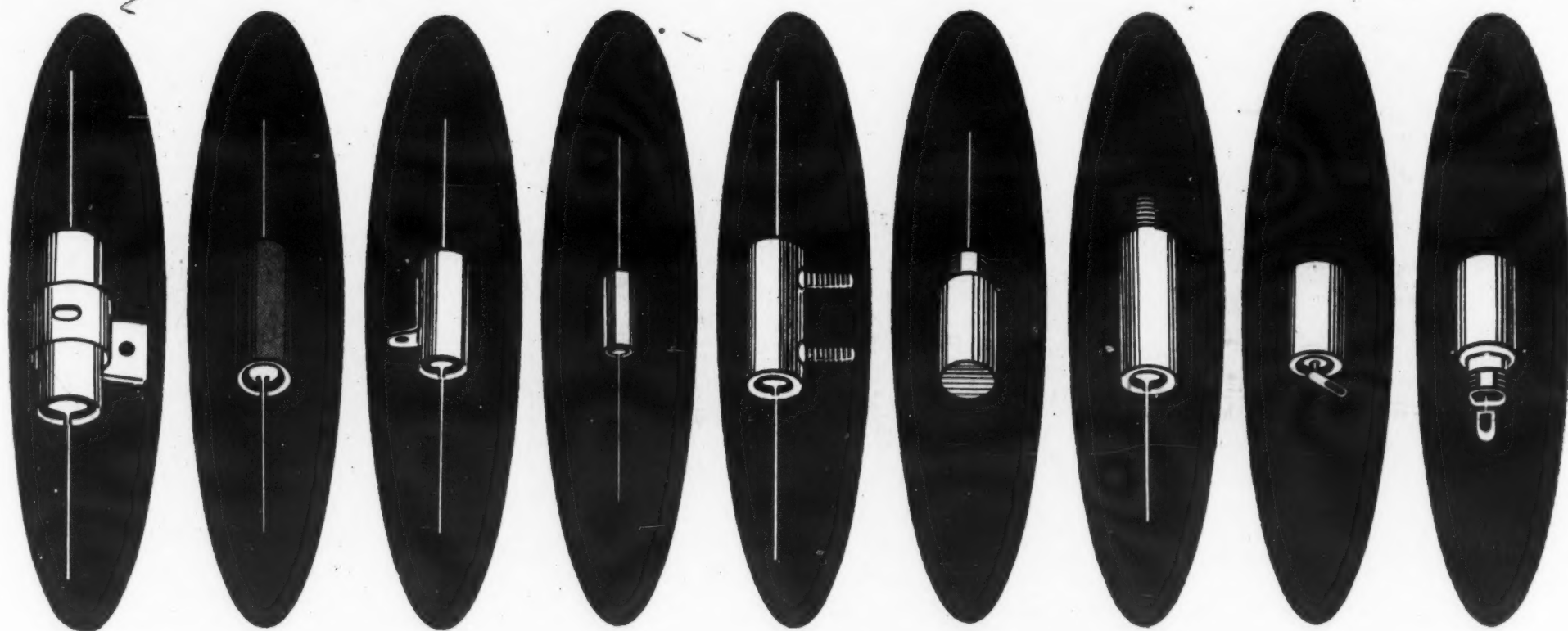
*Insulation resistance higher than
any other metallized paper capacitor*

Self healing dielectric

Here are the finest capacitors which the present state
of the art can produce.

In the application of stringent quality controls, Sprague
has gone so far as to metallize its own paper . . . the
only commercial manufacturer to do this. Thus Sprague
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hermetically sealed with glass-to-metal
solder-seals in corrosion-resistant cases,
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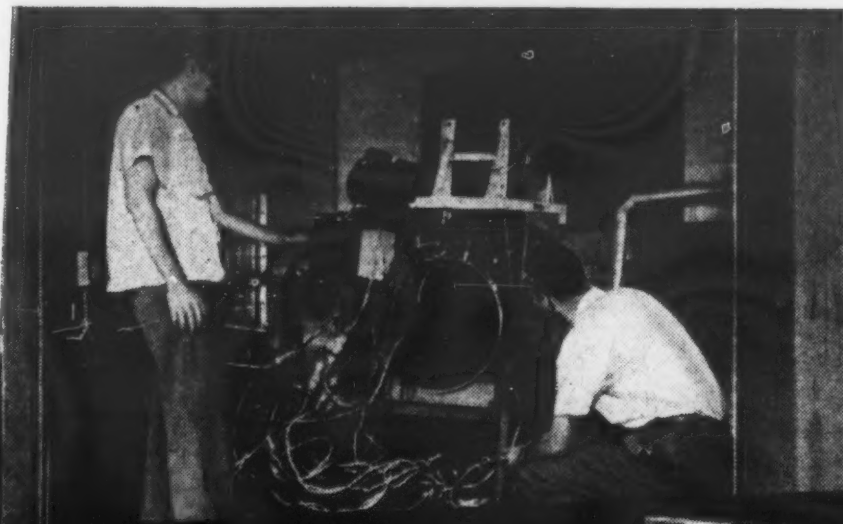
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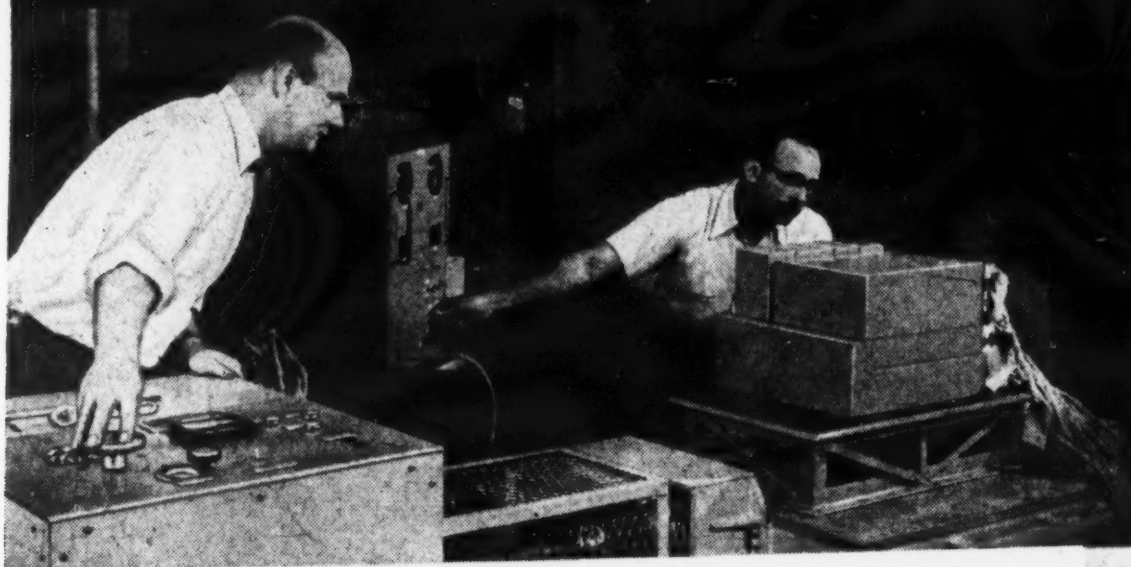


THESE RUGGED ENVIRONMENTAL TESTS

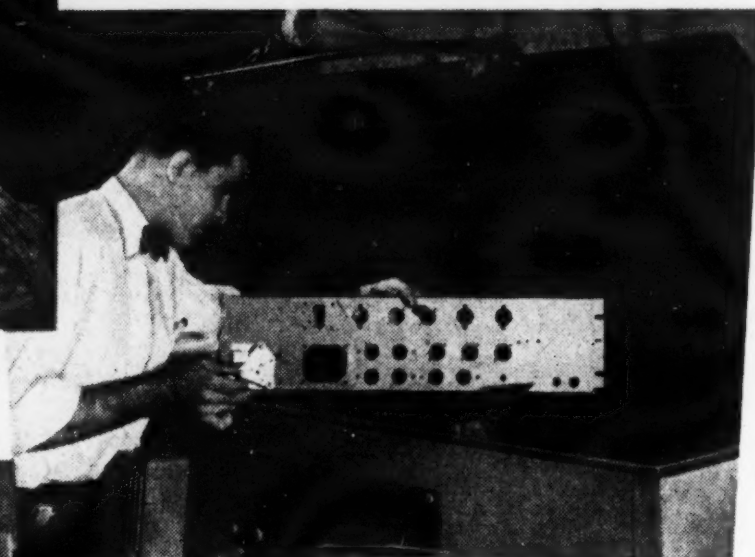
Are Examples of the Many Ways Du Mont
Guarantees the Performance of Better Products Built for
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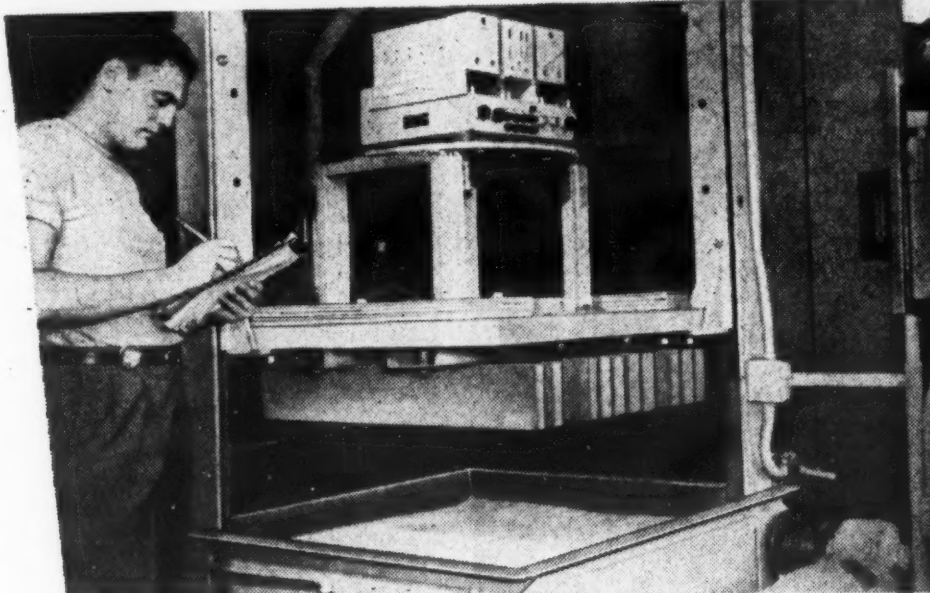
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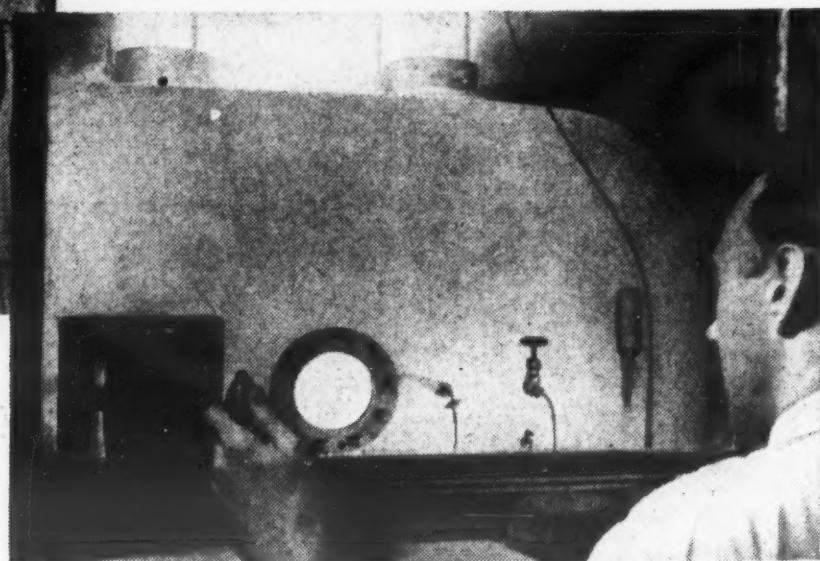


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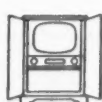
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Report of the 9th Annual AFCEA Convention



Convention Highlights

THE 9TH ANNUAL AFCEA CONVENTION, in keeping with the continuing trend of AFCEA's growing strength, exceeded all others in the quality and quantity of exhibits and demonstrations. More than 900 delegates met in New York City on May 19th, 20th and 21st to discuss mutual problems and see the latest progress in military and industrial communications and electronics.

As the leadoff on the convention's first day, the chapter presidents' meeting featured a report of AFCEA's good health. Highlighted by many favorable reports of new chapters, regular and student, the presidents' meeting set the rapid pace maintained throughout the three days in New York and Fort Monmouth.

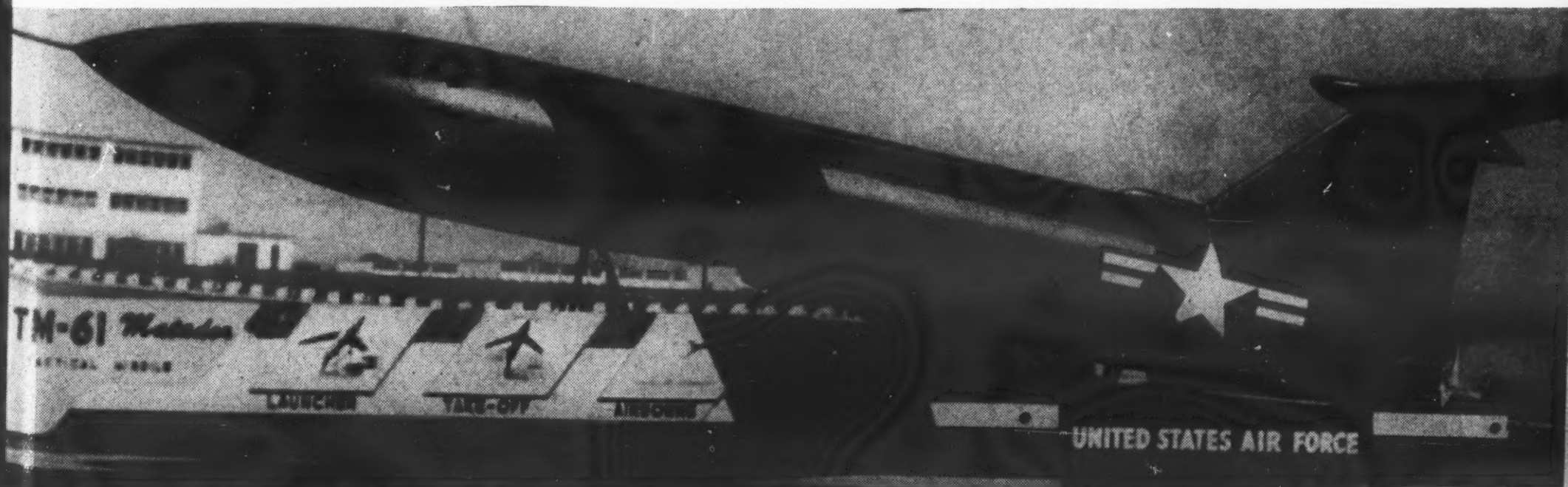
Starting Thursday afternoon's activities was the "Global Communications Pageant" which linked together remote parts of the world by radio, telephone and telegraph while the delegates watched.

The Western Union Telegraph Company showed for the first time how international cables may be used for integrated data processing. A Western Union operator in London transmitted a military requisition directly to special receiving equipment in the Grand Ballroom of the Hotel Commodore. The order, arriving simultaneously in page and punched tape form, was then flashed by printing and facsimile telegraphy to receiving equipment representing several military destinations in the

United States. AFCEA members were shown how payrolls and other business or military information may be sent or received in punched tape or punched card form, ready for automatic processing at the destination on electronic business machines and computers.

Also included on the program was a demonstration of Overseas Teleprinter Exchange Service by RCA Communications. Using teleprinters connected to international radio circuits, TEX calls were made from the convention hall directly to U.S. Air Force bases in France and Germany. AFCEA President George Bailey exchanged greetings with the commanding officers of the overseas bases using this "talk-in-writing"

The U. S. Air Force rocket "Matador" on display in front of Myer Hall, Fort Monmouth, New Jersey, during the AFCEA Convention tour.



facility.

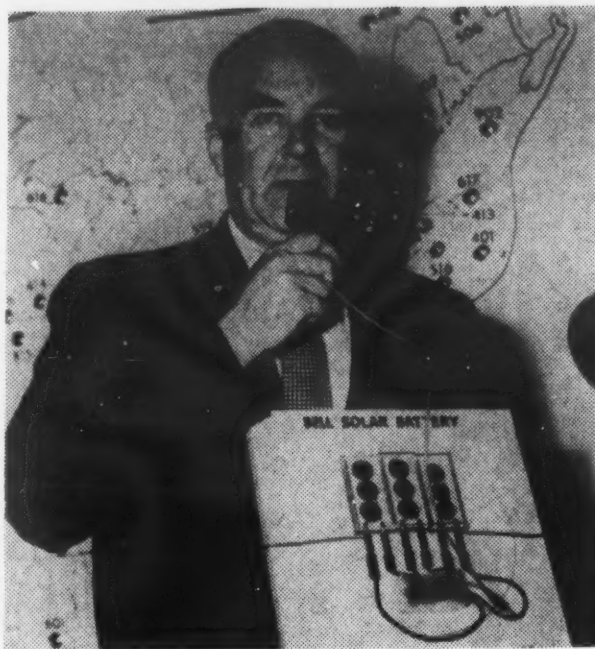
Industrial television equipment, installed by RCA, enabled the audience of 600-plus to watch details of the demonstrations without leaving their seats.

Another dramatic demonstration was the Bell Telephone System's new continent-wide direct distance dialing. As the convention audience followed the progress of the call on a large lighted map, Mr. Bailey dialed direct to the San Francisco office of Rear Admiral John R. Redman, USN, commandant of the 12th Naval District.

The direct distance dialing system currently operates in more than 25 communities. A portion of a talk by Colonel R. S. Zimmer of the New York Telephone Company was broadcast through a solar battery-powered voice amplifier.

All America Cable and Radio demonstrated its operational flexibility by sending greetings via radio to London, Rio de Janeiro, and Lima, Peru and received the replies to the messages via cable.

Following these demonstrations, the Symposium on Global Communications brought together I. T. & T. President William H. Harrison, representing Industry; Major General Rex V. D. Corput, Jr., USA, Director of Communications-Electronics, Department of Defense, Joint Chiefs of Staff; Major General James D. O'Connell, USA, Chief Signal Officer, U.S.A.; Rear Admiral Henry C. Bruton, USN, Director of Naval Communications, and Brigadier General A. L. Pachynski, USAF, Deputy Director of Communications-Electronics, USAF.



Shown above is the Bell Telephone Laboratories' solar-powered radio transmitter over which Colonel Raymond S. Zimmer of the New York Telephone Company broadcast a portion of his talk during the Global Communications Pageant.

Exhibits of latest developments in the three Services were on display following the Symposium and remained open for inspection throughout the remainder of the convention.

The Thursday evening program was a buffet-get-together party, a traditional AFCEA convention event.

Re-election of George Bailey as AFCEA president for the coming year by the national directors at their meeting started the Friday phase of the convention. A trip in the afternoon to the United Nations gave convention delegates a chance to see the "work rooms" of this organization and, while assembled in one of the meeting rooms, Benjamin A. Cohen, Deputy Secretary General of the UN, addressed the AFCEA visitors.

A message from President Eisenhower opened the 9th Annual AFCEA Banquet Friday evening. Senator Leverett Saltonstall of Massachusetts, addressing the banquet, praised the work of the communications-electronics industry and warned of the necessity for a strong military reserve program. At the banquet, the annual "Chapter of the Year" award was presented to the South Texas Chapter by AFCEA Executive Vice President George P. Dixon.

Saturday, delegates and guests journeyed to Fort Monmouth, where they participated in the special activities planned for Armed Forces Day. The three Services exhibited their latest nonclassified electronic equipment and weapons. The Army and Air Force rockets, "Corporal," "Nike," and the "Matador," were among the featured weapons exhibited. The Signal Corps moved its 100-inch camera from the hotel exhibit to Ft. Monmouth. Demonstrations at the new Signal Corps Engineering Laboratory headquarters rounded out the extensive tour.

Concluding the convention and the Armed Forces Day celebration was a garrison review by the Ft. Monmouth troop. The Honorable Robert B. Meyner, Governor of New Jersey, took the review with Mr. Bailey and Major General Victor A. Conrad, commanding general of Ft. Monmouth.

E.R.N.

The text of the talks by the Symposium panel members and excerpts from Senator Saltonstall's banquet address appear on the following pages, with photos of convention activities.

The business sessions of the convention were conducted at the Chapter Presidents' conference and the meetings of the Council and Board of Directors. Below, President George W. Bailey presides over the Directors' meeting. At his right is Counsel Frank W. Wozencraft; and at his left are Executive Vice President George P. Dixon and Chapters Secretary Julia B. Godfrey. At the Directors' table are (l to r): Leslie F. Muter, Theodore L. Bartlett, Maj. Gen. George I. Back, J. Harry LaBrum, Donald F. McClure, RAdm. Frederick R. Furth, David R. Hull, Joseph R. Redman, Percy G. Black, Roland C. Davies and Fred S. Moran.





Symposium on Global Communications

Hotel Commodore, New York

May 19, 1955



AFCEA National President George W. Bailey presents the Global Communications Symposium panel to the convention delegates. Shown (l to r are): George W. Bailey; William H. Harrison, president, International Telephone and Telegraph Corp.; Major General Rex V. D. Corput, Jr., USA, Chairman, Joint Communications-Electronics Committee, Joint Chiefs of Staff; Major General James D. O'Connell, USA, Chief Signal Officer; Rear Admiral Henry C. Bruton, USN, Director, Naval Communications; Brigadier General Alvin L. Pachynski, USAF, Deputy Director, Communications-Electronics, USAF.

William H. Harrison

*President, International Telephone
and Telegraph Corp.*

I WANT TO SAY HOW PROUD I AM TO BE IN AN INDUSTRY which has such an inspiring tradition and proven record of dedication to public service in time of peace and war.

I know I speak for the entire industry when I say that our diplomatic forces and our Armed Forces can count on the resources, the ingenuity and devotion of this industry to serve, come what may out of these troubled international affairs.

Notwithstanding the industry's proven record of service in good and bad times,

it could be stronger;

it could serve the nation's defense and business interests, I suggest, even more effectively;

it could expand and improve facilities at a more progressive rate,

if legislation were enacted which would permit merger of existing carriers.

The industry is in accord on the soundness of this legislation in the national interest, and I feel confident such legislation will at some time be enacted. I hesitate, though, to speculate on when this may be.

In the meantime, within the limited earnings available, and through intensive research and engineering, existing facilities are being modernized, new facilities are being added and operating techniques improved.

There are striking developments in radio involving the

over-the-horizon transmission which should extend and improve services presently dependent on line of sight techniques. In the wire field, there is the now proven experience with long-lived submarine cable repeaters for use in coaxial cables, all of which offers great promise

for unlimited and dependable overseas telecommunication

I need not emphasize to this audience how much far-reaching, more and better communications means to all of the peoples of the world.



Major General Rex V. D. Corput, Jr., USA

Chairman, Joint Communications-Electronics Committee, Joint Chiefs of Staff

THE SUBJECT THAT WE ARE TALKING ABOUT TODAY IS global communications for the Armed Forces. Prior to World War II we in no sense had a global system. True, we did have communications to Panama, Hawaii, the Philippines, and Alaska but no system in the sense that we had later in the war. With activities in North Africa, India, and Australia, we literally had a military system that went around the world, and the same is pretty much true today. As you know we have troops of all Services

Message, via telegram, from the President of the United States

MY GREETINGS GO TO THE MEMBERS OF THE ARMED FORCES COMMUNICATIONS AND ELECTRONICS ASSOCIATION ON THE OCCASION OF YOUR ORGANIZATION'S ANNUAL CONVENTION.

I CONGRATULATE ALL OF YOU ON THE THEME OF YOUR CONVENTION, "GLOBAL COMMUNICATIONS." IT REFLECTS YOUR AWARENESS THAT GLOBAL STRATEGY DEMANDS GLOBAL COMMUNICATIONS OF THE HIGHEST ORDER, AND THAT MODERN TRANSPORTATION MAKES US ACTUAL NEIGHBORS TO PEOPLE IN EVERY QUARTER OF THE EARTH. TO LIVE IN AMITY WITH OUR NEIGHBORS WE MUST UNDERSTAND THEM, AND THEY MUST UNDERSTAND US. THIS MUTUAL UNDERSTANDING CAN BE GREATLY FURTHERED THROUGH GLOBAL COMMUNICATIONS.

I WISH ALL OF YOU A MOST SUCCESSFUL CONVENTION.

/s/ DWIGHT D. EISENHOWER

deployed in the Far East, in Europe, and many other places and the communications to support them are surely global in nature.

Every time the subject of the long haul communications of the military comes up there are certain basic questions that apply to the Army, Navy and Air Force as a group. I am going to attempt to give you a little fill-in information so that when the Services' chief communicators talk you will have this background. (Before I go any further, I want to mention the fact that the Marines get most of their long haul service over Navy circuits and hence aren't mentioned in my discussion.)

One of the first questions that is always asked is: Why do we have three world-wide communications systems? Why would it not be more efficient and more economical to have one system serving everybody? Our command structure, established by Congress, creates the Department of the Army, Department of the Navy

and the Department of the Air Force and charges each with a specific mission. Each department prepares its budget in order to be able to carry out this mission and this budget is approved by Congress. The three missions are different, the three organizations set up to carry out these missions are different and the communications systems of the Services are tailored to permit them to most effectively command their forces.

The second question that outsiders come up with is: Well, if that is the case, why not have a world-wide network for all the administrative traffic, then each Service could have a small private network for purely command traffic? This has two flaws. In the first place, we would immediately have four systems instead of three and remember each system must be large enough to be able to handle the peak traffic which it will expect to receive. The second flaw is: Just what is the difference between command traffic and administrative traffic. A requisition for supply is normally considered to be administrative. When somebody is short on ammunition and puts in a requisition it is much more important than a command message, which states that all men will wear neckties when in rest areas. We handle our messages on the basis of relative importance and forget about the command versus administrative angle.

One point that you must remember with respect to long haul communications is that the equipment is large and takes a long time to manufacture. To install it, land and buildings are necessary and in the case of radio, tested frequencies are also necessary. For these reasons,

Watching Fort Monmouth troops pass in review are (l to r) Maj. Gen. Victor A. Conrad, commanding general, Fort Monmouth; George W. Bailey, AFCEA president, and Col. John C. Monahan, president, AFCEA Fort Monmouth Chapter.



it is extremely important that we have in being, where we are going to need it, all the communications that we would need for the first six to twelve months of a war.

This being the case, it is better to exercise these communications in peacetime by handling relatively low precedence traffic than to let them stand idle. This is true with respect to overseas circuits. We do not have to maintain this reserve in the Zone of the Interior, as we lease almost everything and rely on the flexibility of the commercial companies to take care of our emergency needs.

The Services have in the past few years been going toward automatic switching for teletype traffic, and the three types of relay switching centers being developed are different. This is not accidental but is due to differences in the organization, mission and disposition of the Service forces as I have already mentioned. This results in their traffic patterns' being different. For example, the number of multiple address messages varies widely among the Services. The use of identical equipment layouts would be foolish. This difference in pattern will be made more clear by the service communicators in their talks.

All that I have said so far would seem to indicate complete triplication. This is not the case. There is an organization known as the Joint Communications-Electronics Committee with the chief communicators of the Services as members and myself as chairman. We carefully scrutinize the plans for meeting the requirements of the Services to see to it that they are most economically met. We see to it that the systems are compatible so that no special procedure is necessary for a message to go from the Air Force to the Navy to the Army systems. We establish procedures with respect to all forms of communications. We establish criteria for equipment and endeavor to eliminate duplication in all fields. We coordinate the allocation of radio frequencies to the military.



Major General James D. O'Connell, USA

Chief Signal Officer, U.S. Army

I'D LIKE TO ASK YOU TO LOOK BACK WITH ME OVER THE years to a time we thought was peace. The date—25 June 1950—The place—Seoul, Korea—The time—2:00 p.m.

A phone rings at the American Embassy in Seoul. Someone shouts—the Republic of Korea is being invaded by an Army of North Korean Communists. They are marching on Seoul. The connection is broken. The American Ambassador in Seoul asks the Army Signal Corps to get him through to General MacArthur in Tokyo. There is a handful of Signal Corps men in Korea. Some are attached to the American Embassy, some to the American Military Advisory Group. The combined Military State Department facilities between Seoul and Tokyo consist of one Signal Corps operated radio teletype circuit and one leased telephone circuit.

General Back, General MacArthur's Signal Officer,

I have been chairman of this organization now for about two years and during that period some 462 items have been before this group on which action has been completed. Furthermore, our decisions that affect funds are reviewed by the Service Secretaries, the Secretary of Defense, the Bureau of the Budget, and Congress.

About a year and a half ago, Mr. Harold Botkin, who is now Assistant Director for Telecommunications, Office of Defense Mobilization, made a thorough check of the communications activities of the Services for the Secretary of Defense. In his report he said in part:

"I wanted to point out these differences because a great deal has been said about duplication, and integration has been suggested as a possible economy move. Complete integration of communications, in my opinion, is no more practical for the three Services than integration of the communication facilities of three large industrial companies with separate management."

Another paragraph of the report was:

"The cooperation of all the departments has been excellent and I have found that all of the people are anxious to do a good job. They know their jobs; they are well trained; the morale is high; and the job before all of us is largely a continuing one of getting the facts and coordinating the work."

Before concluding, I want to call to your attention the joint aspect of the many operations that we are carrying on. We have joint headquarters in many places whose command communications are furnished by agreement among the Services, sometimes entirely through the facilities of one of the Services and sometimes through the facilities of more than one of the Services. This fact in itself is certainly an incentive for us to arrange that our equipment is capable and our procedures are identical.

— — — — —

knows that the channels of command must be maintained. He starts more signal men toward Seoul. At 9 a.m. 27 June, Tokyo gets an urgent radio teletype message. It reads: "Evacuating Seoul."

"Embassy radio station and telephone exchange being destroyed. This is our last message."

Tokyo replies: "We will stand by for you on manual." The channel of information and command has been broken.

Three hours and twenty-six minutes later, Tokyo receives a message from Suwon Airstrip, twenty-five miles south of Seoul. Seoul Signal Corps detachment has put in service two truck-mounted hand-keyed radio stations. Here were trained Army Signal professionals doing their job.

Forty-eight hours have now elapsed since the Com-



Following his address to touring AFCEA members, Benjamin A. Cohen, Deputy Secretary General of the United Nations, is pictured with AFCEA National President, George W. Bailey.

munists crossed the 38th Parallel. Over the ACAN circuits General MacArthur receives his guidance from the President of the United States. We are going to resist this act of aggression. General Back organizes a team of 18 hand-picked men to fly to Suwon. Many hours later the plane has not arrived. General Back checks every hour. Then every half hour. Finally there is a report—the plane has crashed—no survivors.

General Back picks a second group of Signal Corps technicians. They arrive in Korea. Communications are established and maintained from that day on. The build-up to final adequacy involved the provision of 81 telephone and 50 teletype circuits.

I relate the foregoing because it is the only way I know to create some impression of the sense of crisis and impending disaster when command communications are not available or are not adequate. The prevention of such crises, or their prompt elimination, is the goal of the communications officer of every service. General Matejka and General Lanahan, if they are here, could speak of the urgencies and difficulties of establishing and maintaining communications in many places in North Africa and in Europe during World War II.

Toward the end of the Korean conflict, General Van Fleet, senior field commander in Korea, summed it up this way. He said, "We are particularly fortunate in having magnificent signal communications. No army at any time has ever had better."

In brief, ladies and gentlemen, this typifies what the Army expects of its global communications. The ACAN, short for Army Command and Administrative Network, is not only a well engineered, fixed communications system with modern equipment operating from and to major military headquarters. More fundamentally, it consists of capable and highly responsive combat communicators trained and ready for any emergency—ready to carry out the mission, to keep the voice of command in service.

The ACAN, which is the Army's global communications system, has developed and grown from combat demands whenever United States forces were called upon to fight or to prepare to fight in different parts of the world. In the Spanish-American War, over 1,000 miles of telegraph, telephone, and cable lines were laid in the Philippines and the first foreign military radio channel was established.

World War I saw the buildup of the ACAN to support the U.S. Army Expeditionary Forces in Europe; World War II required a global communications system to support the U.S. Army and the Army Air Corps in action all over the world. Subsequent to World War II, in the period of cold and hot wars of jet aircraft, guided missiles, and of atomic weapons, the Army Signal Corps has maintained ACAN, linking all Army major headquarters and commands throughout the world. It provides the essential channels for command, intelligence, and logistical purposes.

Designed primarily to meet the Army's requirements, the ACAN works in close cooperation with the communications system of the Air Force and the Navy. The three service networks, each planned and employed to provide for the operational requirements of the individual service, are interconnected at 39 points throughout the world to support one another. It is not unusual for an Army message to be transmitted over the facilities of all three services enroute to its final destination outside of the Army major headquarters command structure.

At this point, let me say that the joint coordination and planning in the JCEC, under General Corput's leadership, is producing results. Speaking for Army communications, I know that we have learned much in the last several years about the operational needs of the other two services.

We understand these needs and we know well and highly respect the other service communicators. Integration of this kind is sound—will work—and is working.

A typical example of the way the three services have worked together took place during the early days of the Korean campaign when General MacArthur had occasion to visit Formosa for the purpose of conferring with General Chiang Kai-shek. General MacArthur ordered that he be in direct communication with his headquarters in Tokyo during his stay in Formosa. General MacArthur's Signal Officer made a request to the Navy Communications Officer of U.S. Naval Forces. Almost instantly communication was established over a channel from Navy-Tokyo to a naval vessel in Formosan waters and then ship-shore to General MacArthur's temporary headquarters on Formosa. I can cite numerous other examples of this kind involving mutual support of the Air Force, Navy and Army.

As most of you know, in this country the bulk of the Army's system is what we call the domestic part of the

Ending the tour of the United Nations Building, AFCEA convention delegates pause in the U.N. Meditation Room.





Chapter of the Year Contest results were announced during the annual banquet as follows: largest number of new members—Fort Monmouth; highest percentage of new members—South Texas; highest percentage of renewals—South Texas; maximum number of regular meetings—Augusta-Camp Gordon, North Texas and South Texas. Certificates were awarded to each of these chapters, and the South Texas Chapter was named "Chapter of the Year" and awarded the special engraved plaque. Above, left to right, are: Col. Ray M. Bagley, OCSigO, who accepted the certificate on behalf of the Augusta-Camp Gordon Chapter; Howard H. Davenport, president of the South Texas Chapter; Col. John C. Monahan, president of the Fort Monmouth Chapter; and Howard L. Housley, president of the North Texas Chapter.

ACAN. It is provided with and by leased circuits and facilities from the various communications companies. At this time, I would like to *acknowledge the Army's very great appreciation for the splendid support and cooperation we receive from the commercial companies.* They have assisted the Army in meeting its requirements in peace and in war.

Future Requirements

I would like to touch briefly on some of our major areas of interest for the future. One is the attainment of secure strategic radio communications for our principal commands throughout the world. Another is the conservation and improvement of our world-wide facilities and systems to incorporate new high-speed electronic computer and data processing equipment into our networks to support the demands of our logistic and supply operations.

A third is the modernization and improvement of our system to provide more efficient and economical service. For example, the fully automatic teletypewriter switching center program which will make substantial economies in operating personnel.

The most important goal of all is *to attract, to train and to retain* the best possible military communicators we can get. Today, the job of the Army Signal Corps is to get the message through in spite of hell, high water, or the hydrogen bomb. The key to survival in this atomic era rests in our ability to act—and react instantly. One vital element of United States combat readiness is the Army Command and Administrative Network, "Communications in Being," and in "Readiness." We feel that it is our duty and our responsibility to maintain combat readiness in our communications system. This is the state of mind and of spirit which imbues the men of ACAN!

— — — — —



Rear Admiral Henry C. Bruton, USN

Director, Naval Communications

BEFORE DESCRIBING THE U. S. NAVAL WORLDWIDE communication system, I would like to outline briefly the Naval communications problem. In the first place, the Navy has the obvious and unique requirement of furnishing communications for its ships, now numbering more than 1,000 of all types, and including almost 200 ships of the military sea transportation service, virtually a fleet in itself. It must also provide means of communication for the Navy Department in Washington, for the continental and overseas fleet bases, and for the Naval shore establishment.

But the Naval communications problem also involves the meeting of requirements similar to some of those of the Air Force, in that the system must furnish a wide variety of communications services for the Navy's vital air arm, comprising more than 10,000 operating aircraft and almost 100 Naval air bases and stations.

In addition, the Naval communications problem includes requirements similar to some of those of the Army, in that communications services must be provided for the ever-ready and essentially mobile U. S. Marine Corps of more than 200,000 personnel, with their organic

aircraft. Finally, Naval communications must and does fulfill some of the communications requirements of our very closely related sister service which operates as a part of the Navy in time of war, the U. S. Coast Guard.

Approached in another manner, Naval communications must provide facilities and services by means of which the Secretary of the Navy can administer the Naval establishment, and through which the Chief of Naval Operations can command, via fleet and force commanders, the operating forces of the Navy, which include ships, fleet aviation and fleet marine forces. It must provide similar facilities for lower echelons of Naval command, and for extensive administrative communications in peace and in war.

The Naval communication system meets these diversified requirements essentially by means of a worldwide shore network which is linked to the various elements of the Naval establishment, including Naval commanders afloat and ashore, ships, aircraft, bases, and elements of the U. S. Marine Corps.

This worldwide shore network comprises 6 primary communication centers, 16 major communication centers, 25 minor communication centers and some 360 tributaries, all interconnected primarily by teletypewriter means, landwire or radio.

The 6 primary centers, strategically located at Washington, San Francisco, Honolulu, Guam, Balboa and Port Lyautey, French Morocco, form the nucleus of the shore system and furnish complete radio coverage over most of the world's ocean areas, primarily for communication to ships at sea. In order that ships will not be required to reveal their presence and location by answering-up, the Navy has adopted the broadcast "Do Not Answer" method as a primary means of delivering important traffic to ships at sea. Obviously, the employment of this method requires the highest degree of coverage and reliability. The 6 primary centers normally meet this requirement by the use of very high power (350 to 500 kw) very low frequency transmitters, keyed simultaneously with 4 or 5 high frequency transmitters. Due to present limitations on keying speeds of the very low frequency transmitters, this primary fleet broadcast is Boehme-keyed at manual speeds not to exceed 25 words per minute. However, considerable progress is being

Message, via tape recording, from the Chairman of the Joint Chiefs of Staff

MY GREETINGS TODAY TO THE ARMED FORCES COMMUNICATIONS AND ELECTRONICS ASSOCIATION GIVE ME A FEELING NOT ONLY OF PLEASURE BUT ALSO OF GRATITUDE. WE IN THE ARMED FORCES GLADLY ACKNOWLEDGE THE DEBT WHICH WE OWE TO AMERICA'S SCIENTIFIC GENIUS AND INDUSTRIAL EFFICIENCY. PARTICULARLY AM I GLAD TO ACKNOWLEDGE THE SIGNIFICANT CONTRIBUTIONS TO OUR MILITARY EFFECTIVENESS MADE BY THE SEGMENT OF AMERICAN INDUSTRY AND SCIENCE WHICH IS REPRESENTED AT YOUR CONVENTION. YOUR PATRIOTIC OBJECTIVES ARE A SOURCE OF GRATIFICATION TO THOSE OF US IN UNIFORM.

I HAVE BEEN INFORMED THAT THE THEME OF YOUR CONVENTION IS "GLOBAL COMMUNICATIONS". THIS IS A MOST APPROPRIATE THEME. MODERN CHANGES IN THE TECHNIQUES OF WARFARE HAVE CAUSED COMMUNICATIONS, ELECTRONICS, AND PHOTOGRAPHY TO PLAY A ROLE—MORE IMPORTANT THAN EVER.

FORTUNATELY, YOUR ASSOCIATION IS A VALUABLE COMPONENT OF OUR DEFENSE TEAM. YOUR MEETING IS A FINE OPPORTUNITY FOR LEADERS IN INDUSTRY AND MEMBERS OF THE ARMED FORCES TO MEET AND DISCUSS MUTUAL PROBLEMS. THE ARMED FORCES AND INDUSTRY ARE TRULY PARTNERS IN DEFENSE. MY CONGRATULATIONS AND BEST WISHES TO EACH OF YOU.

/s/ ARTHUR RADFORD
Admiral, USN

made in the development of frequency-shift keying of these very low frequency transmitters with a view to their employment at teletypewriter speeds.

These primary centers also provide a primary general broadcast of time signals, weather, hydrographic warnings, etc., radio teletypewriter broadcast to ships equipped to receive such, high power ship-to-shore and shore-to-ship manually keyed circuits, high power high frequency duplex radio teletypewriter circuits for fleet commanders and other services.

The major communication centers maintain secondary fleet and general broadcasts of limited area coverage, local harbor circuits, and high power high frequency ship-to-shore circuits. In some cases, high power high frequency duplex radio teletypewriter circuits for fleet and force commanders in the vicinity, plus other services, are also maintained.

(Continued on page 22)

Pictured below are the 1955 Convention committee chairmen. Seated (l to r) Theodore L. Bartlett, Exhibits; Allen E. Wharton, president, New York Chapter; Benjamin H. Oliver, Jr., Convention chairman; George W. Bailey, National President, and George P. Dixon, Executive Vice President. Back row: Albert C. Holt, Publicity; Henry R. Bang, Banquet; Donald F. McClure, Social Hour Arrangements; John A. Spangenberg, Assistant, Hotel Arrangements; Edwin C. Carlson, Hospitality; Ludwig R. Engler, Registration; Henry A. Neimeier, Facilities, and Theodore N. Pope, Entertainment, Arrangements for Guests.



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The 25 minor communication centers furnish limited fleet support in their vicinity.

All these 47 primary, major and minor Naval communication centers are linked by radio or landwire trunk circuits of varying capacities, depending on the need.

The 360-odd tributaries are teletypewriter users ashore, large and small, who are linked to the various communication centers. Examples are: shipyards, Naval ammunition depots, large recruiting centers, training stations, etc. In addition, communication centers located on Naval base complexes serve a number of local activities by short teletypewriter links.

A typical communication center ashore will comprise a transmitting station, a receiving station, and a centrally located message center with terminal and relay equipment. In the larger centers, these facilities normally are separated by about 20 miles and are linked by high capacity microwave or wire circuits.

Naval air activities ashore are linked to the shore communication system and utilize this system for much of their traffic. For ground-to-air communications, these air activities in some localities control transmitting equipment located at nearby communication centers. In other localities, they utilize transmitting equipment provided at the activity itself. Normally, receiving equipment is available locally.

With some few exceptions, U. S. Marine Corps activities, continental and overseas, are linked to the Naval shore communication system and make full use of its facilities. U. S. Marine Corps units deployed in the field utilize organic communications equipment for tactical use and for interconnection with the nearest military communication facility. Marine Corps units deployed on Okinawa are served, for example, by the Army communication system.

The problems of communications within the fleet are equally important and in many regards, are the most difficult of all. To mention a few, there is the interference problem resulting from locating a wide variety of elec-

tronic equipment, covering many frequencies, in essentially adjacent spaces; the severe restrictions on antennae in order to maintain free areas of fire for anti-aircraft weapons and to keep flight decks clear on aircraft carriers for air operations; the conflicting requirements of radio security from enemy radio direction finders, versus the continuing need for communications for tactical maneuvering and for the very extensive exchange of information needed for surface and anti-submarine warfare and for air defense, and the important requirements for surface-to-air communications to control Naval aircraft on strikes and on air defense missions, and to return them safely to their highly mobile bases.

For short-range inter-ship communications and for medium-range ship-to-air communications, the Navy has resorted to the ultra high frequency band, with ship or air relay where required. Medium and high frequencies are employed for greater distances; radio teletypewriter circuits are provided where the traffic volume demands. Visual communications, including flag hoist, semaphore and flashing light, are extensively employed when ships are in visual range of each other.

The already difficult fleet communications problem is becoming aggravated, on one hand by the need for dispersed formations for defense against atomic attack, and on the other by the desirability of complete electronic silence to keep the location and the movements of the fleet unknown to the enemy, but yet under the control of the fleet commander.

I hope this essentially non-technical outline has helped you to understand a little better the problems of Naval communications, and some of the means we have employed to solve them. With the ever increasing magnitude and complexity of communications and electronic problems, we will more than ever need the interest, thought and assistance of our fellow industrial members of the AFCEA, to assist us in our endeavors to continue to provide adequate communications for the fleet.

— — — — —



Brigadier General Alvin L. Pachynski, USAF

*Deputy Director of Communications-
Electronics, USAF*

WITHIN THE LAST YEAR, AIR FORCE JET FIGHTERS crossed the continent in a little over four hours; a jet bomber in a test flight flew at 622 miles an hour; another jet bomber stayed in the air 47 hours. These were not stunts. They illustrated the speed and endurance of which the aircraft presently in the Air Force inventory are capable; they demonstrated how the factors of time and space in air warfare continue to be rapidly reduced.

The increasing speeds and ranges of military aircraft have their impact on offensive and defensive air operations, tactical air warfare and air logistics. These place more exacting demands on the communications-electronics ground environment which must support military

air operations. Conventional methods and techniques, as most of us know them, are rapidly obsolescing. The area of communications-electronics in air operations must take advantage of every feasible state of the art advance if the amazingly rapid advances in the air weapon are to be fully exploited. We cannot afford to stand still.

In the Air Force we divide the communications-electronics environment within which the military airplane must fly, fight and be logistically and administratively supported, into four areas—*aircraft control and warning*—*aids to navigation*—*air traffic control*—and *communications*. None of these four areas is dealt with as an independent entity. They are all interdependent and inter-

connected. Further, they must all be standard in equipment, methods and procedures in all areas where they are established. An interceptor assigned to the continental U.S. air defense is capable of immediate movement to air defense operations in Europe or the Far East, and vice-versa. Strategic Air Command and Tactical Air Command units rotate periodically for training purposes between the U.S. and overseas areas. The Military Air Transport Service operates military air transports at the rate of one every 54 minutes over military airways across the Atlantic and Pacific oceans as a routine matter. Air operations and supporting communications and electronics systems must be uniform world-wide.

Aircraft control and warning systems are designed to provide the requisite degree of alert to air defense forces and to control and direct the weapons used to prevent a successful air attack by the enemy. The communications-electronics means are provided for detecting aircraft at sufficient ranges to insure a successful defense and to identify all aircraft detected and tracked as friend or foe. Timely employment of defense weapons, whether they be aircraft, guns or missiles, requires that an effective communications system be available connecting all elements of the ground defense environment (detection, command, and control).

The increasing speed of aircraft has dictated more and more the substitution of automatic means for the various communications-electronics functions in air defense which have in the past been satisfactorily performed through manual methods. Computers are displacing human plotters, and data transmission systems are replacing human teletype and telephone operators. A greater degree of centralized control over a wider area is being



Colonel George P. Dixon, Executive Vice President of AFCEA, is shown discussing a message during a convention function with his newly appointed assistant, Edward R. Nida.

substituted for more decentralized operations when aircraft were slower. The interconnecting communications system must conform to these changes in techniques of operation as they take place.

Navigation Necessary for Safety

Aids to navigation within the Air Force serve those installations which are not on established airways or which have requirements for navigational aids over and



Pictured at the buffet supper at Fort Monmouth, New Jersey, are Major General George I. Back, former Chief Signal Officer; New Jersey State Senator Richard R. Stout and Major General H. C. Ingles, USA (ret.), former president, RCA Communications, Inc. and former Chief Signal Officer.

above those supplied by the federal airways or the International Civil Aviation Organization.

The basic requirement for a navigation system is to enable aircraft to be navigated safely over all portions of a route, including take-off and landing under all flying conditions.

The density of air traffic has made precise navigation necessary for safety. It is essential that the current position of the aircraft be presented to the pilot continually in such a manner that the immediate future position of the aircraft can be readily determined. The navigation information presented to the pilot must include direction, distance, and height, and it is also important that this information be available to all aircraft simultaneously.

To satisfy these basic requirements, it is necessary that the specific facilities involved in furnishing navigational aid be constantly improved and supplemented. They must be world-wide in application (at least in those areas where military air operations may occur); be operable in all types of weather on a continuous basis; define any track along which an aircraft may be required to fly and provide continuous navigational-fix information during all conditions of flight, be sufficiently accurate to support safe traffic control and position an aircraft so that airborne fire control will be effective; provide information necessary to fly the aircraft without dependence on communications between aircraft and ground operators; present visually as much data as practicable and provide aural indication of urgent or infrequent data, and insure that information made available to the pilot or aircrew can be simply interpreted and in such form as to be directly applicable to the maneuvering of the aircraft. Electronics coupling to automatic flight control should be possible.

Meeting these requirements is a large order. While we have made phenomenal progress in the last decade, we are still some distance from our goal of an accurate, global navigation system.

Air traffic control is required where two or more aircraft are in the same area under restricted visibility conditions. As the density of air traffic becomes greater, the complexity of control increases very rapidly. Ground-coordinated air traffic control is then most necessary for orderly and expeditious handling of traffic. Random

flight movements under conditions of poor visibility demand that prescribed flight paths be traveled under the guidance of a central controller. The prime requirements of any air traffic control system are maintenance of safe separation between aircraft without impeding the flow of traffic, and the expeditious handling of aircraft operating in the system.

To accomplish these two prime requirements the air traffic control system must provide means for: insertion of new traffic into the traffic flow at any point en route; rearrangement of traffic flow to handle emergencies, special priorities, and other irregularities; automatic transmission to the aircraft, for display therein, of traffic control clearances; segregation of aircraft into different speed categories whenever necessary to increase the capacity of the system; readjustment of the flow or sequence of aircraft when conditions such as hazardous weather require a lengthening of the proposed flight track, coordination of the final precise flow of traffic to the runways with maximum restriction at each stage of the flight, and collection, transmission, storage, and display of information pertinent to the operation of aircraft in the system. Provision should be made for selecting the area desired to be displayed. Warning of conflicts and emergencies should be provided.

So much for air traffic control.

In the area of *communications*, referred to here in the classical sense, the Air Force operates (as most of you know) a global communication system. This system supports our active air operations in peace and in war. It is not a point-to-point system alone, but is operationally integrated with the other functional communications-electronics systems just described. It operates ground-air extension for communication with aircraft in flight operations in any part of the globe in which the Air Force has facilities.

The system has been designed to provide the means for instant command and control by a commander of any of his units or aircraft on the ground or in the air, wherever they may be. It must provide the communications required for logistic and administrative support of these mobile units. It handles the message traffic generated by air traffic movements over military airways, and the collection and dissemination of weather data and

Taking part in the "Pageant of Communications Progress" are (left) Robert D. Merrill, vice president, American Cable and Radio Corp., and NBC commentator, Ben Grauer.



William H. Harrison, president, International Telephone and Telegraph Corporation, at left, pauses after registration to talk with W. Walter Watts, executive vice president, Radio Corporation of America.

information on a global basis. With the constantly increasing speed and range of our military aircraft, time is of the essence, and speed and reliability of communications are paramount requirements.

Just as we design our communications to integrate with other internal Air Force communications-electronics functions, we must insure that we can continue to operate on an integrated basis with the communications systems of our sister services. We in the Services cannot, either from the economic standpoint or from the overall national defense interest, each dig his own hole, as it were, and be self-sufficient within it. Our experience in past conflicts has amply demonstrated that in war the combined Services communication facilities must be capable of operating as an integrated whole if the requisite degree of flexibility in operations is to be maintained. Messages must be capable of flowing rapidly and reliably over any system, no matter where originated, if our operations are to be successful. In any atomic war, this is all the more significant.

This is the view of the Joint Communications-Electronics Committee. This is its objective and that of the Air Force. It is reflected in our peacetime operations and planning. Today the Air Force is served by both Army and Navy facilities and by commercial facilities. We have channels allocated in the Naval communications system from Washington to San Juan, Balboa, Port Lyautey, Pearl Harbor, and Londonderry, England; from San Francisco to Guam and Okinawa; from Port Lyautey to Naples; and from Guam to Tokyo. The Army has allocated us channels in the ACAN system from Washington to Heidelberg and Hawaii; from San Francisco to Tokyo and Hawaii; and from Hawaii to Alaska.

In summary, the Air Force communications-electronics system must be molded to the requirements of the air weapon. Time and space factors dictate these requirements; conventional techniques as we know them are no longer capable of providing the required communications-electronics environment for air operations; and new techniques (as rapidly as the state of the art permits) must continue to be applied on a global basis to permit full exploitation of the rapidly increasing air weapon capabilities.



9th Annual AFCEA Banquet

Excerpts from the Address by

The Honorable Leverett Saltonstall,

**Senior Senator from Massachusetts and ranking
Republican member of the Senate Armed Services Committee**

THIS COUNTRY IN THIS TIME OF TENSION FACES TWO GREAT tasks: the preparation and the building up of maximum defense of our nation against potential aggressors at the least possible cost in blood and treasure to ourselves, and a sustained offensive through science to greater economic security and improved living standards for all our people. It is our job, working hard together, to devote ourselves and our resources to these ends.

The tension in the Far East on Quemoy, Matsu and Formosa, the recent entry of Germany into the North Atlantic Treaty Organization, and the signing of the treaty with Austria all make us examine sharply our military policies and our total preparedness program. The recent reports of Russian air strength, particularly those of the Soviet's long-range bombers, remind us equally that we cannot afford to be anything but alert and fully prepared.

On the other hand, there is no point whatever in our being scared! As President Eisenhower has so well said, we have not lost in the twinkling of an eye our capability for meeting and defeating any air force in the world. We have the President's experience and judgment and that of Secretary of the Air Force Talbott and Air Chief of Staff General Twining to this same effect. *Let me say just as forcefully as I can that we are ready now to meet successfully any and every challenge to our security!*

We do have the largest armed force in our peacetime history. We want to make it smaller if we safely can, yet when, for example, we realize these facts of military requirements today, we know that we cannot afford anything but the best and most modern weapons and the finest of trained military forces. In the face of this need, we must now admit that our system of reserve training is woefully poor. In too many instances it is also utterly unfair to those who as patriotic citizens want to be part of our active reserve.

In my opinion, our military reserve policies must be drastically overhauled, and at top speed. The best of modern weapons and the largest trained reserve are indispensable requirements for our defense now. The military preparedness program President Eisenhower has recommended and his proposals for training our reserves are sound in their

fundamentals. Our job now is to put them into effect.

* * *

This country's young manpower, in college and out of it, represents our greatest asset in these times of tension and crisis. Only as this asset is made use of to maximum effect can we achieve the security we must have. Simultaneously, we must be as fair as possible to these young men whom we call upon to serve. Only a clear-cut military and reserve policy and program will make it possible for them to plan their high school, college or working years in a way that makes sense for them personally while serving the nation's needs.

A strong well-trained reserve is absolutely essential to our country's defense. The Congress must see to its establishment and our people throughout the United States must have a full understanding of our objectives.

You people here tonight are particularly interested in the fields of communications and electronics. Nowhere perhaps in all the areas of preparedness have there been more spectacular and more meaningful advances. Let me cite examples of those I have discussed with the Pentagon.

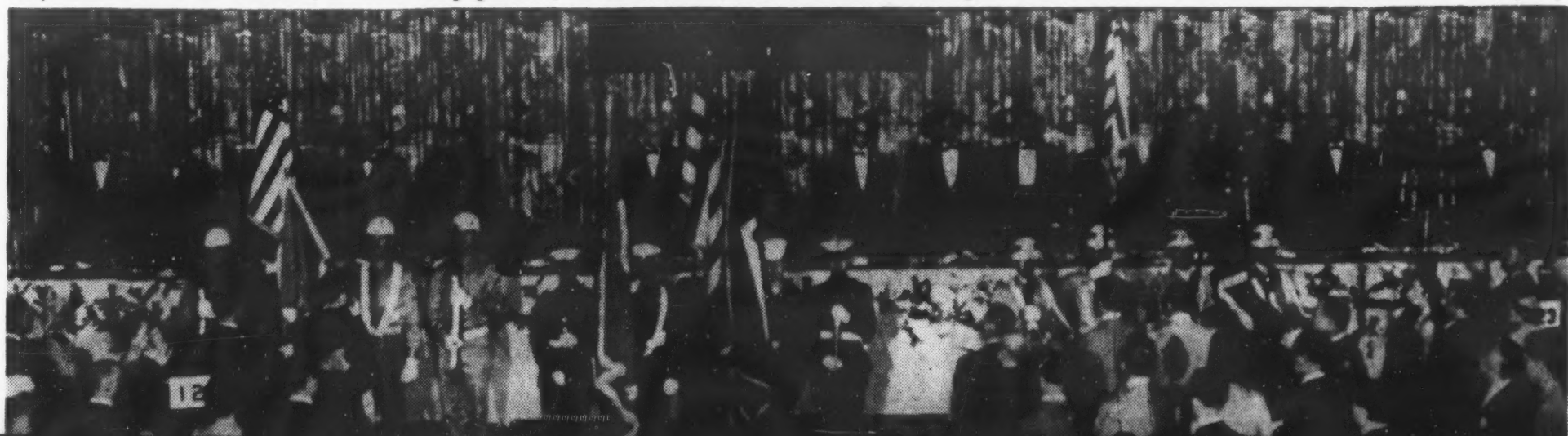
First, electronic computers, both simple and complex, are emerging from the laboratories and becoming integral parts of vital military electronics systems. The thousands of components used in many of these must be exceptionally reliable and stable and they, therefore, pose continuing challenges for our scientists in these fields. Another development, one which had its origin in World War II, is the radio-teletype system which has been constantly improved in recent years.

* * *

Communications and electronic equipment have found their way into every area of military operations. They rank with manpower and weapons as one of the major combat determinants of our fighting forces.

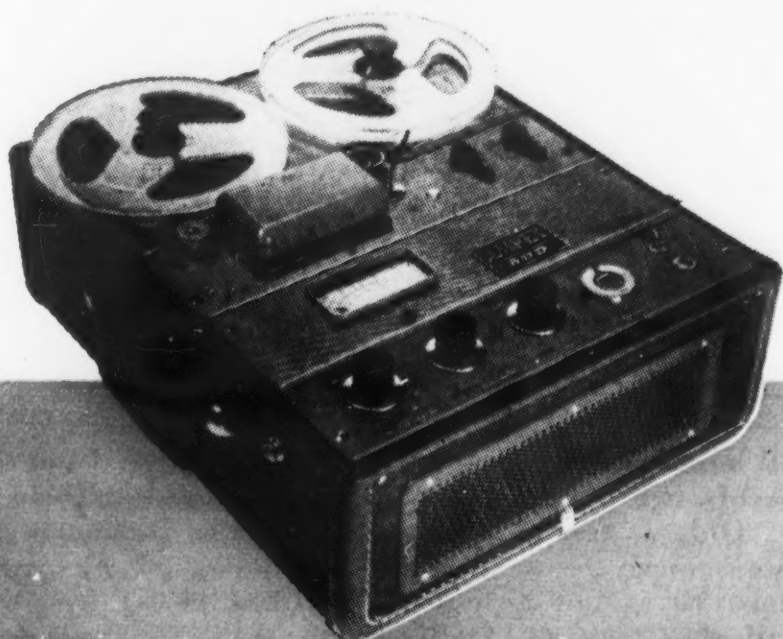
But let us all remember that these inventions which help us to fight successfully are also mighty valuable for our peacetime pursuits, and month by month in these areas of electronics and communications new developments are contributing increasingly to more efficient and more enjoyable living for all our people.

Pictured below is the head table at the AFCEA banquet. Guests of honor were: Col. John C. Monahan, president, Ft. Monmouth Chapter; George P. Dixon, Executive Vice President; Capt. Linwood S. Howeth, USN, Technical Advisor to Director, Naval Communications; Joseph R. Redman, consultant, Western Union Telegraph Co.; William H. Harrison, president, I. T. & T.; Maj. Gen. Gordon A. Blake, Director of Communications-Electronics, USAF; Brig. Gen. Henry Darlington, president, Military Chaplains Association of the U.S.A.; Benjamin H. Oliver, Jr., Convention chairman; Allen E. Wharton, president, New York Chapter; Frank W. Wozencraft, president, Washington Chapter; Leverett Saltonstall, U.S. Senator; George W. Bailey, National President; Maj. Gen. Harry C. Ingles, USA (ret.), former CSigO; Maj. Gen. George I. Back, former CSigO; Maj. Gen. Rex V. D. Corput, Jr., chairman, JCEC; W. W. Watts, executive vice president, RCA; Maj. Gen. Victor A. Conrad, commanding general, Ft. Monmouth, and William J. Halligan, chairman of the board, The Hallicrafters Company.



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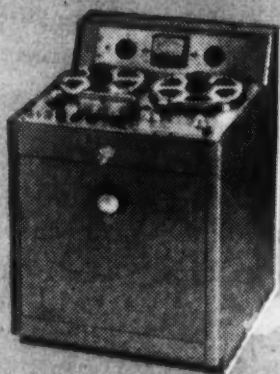
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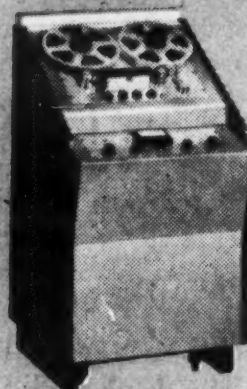
The 300 Series comprises the most perfect sound recording machines yet offered by any manufacturer. They are unexcelled for performances deserving the finest recording and reproduction it is possible to make. Superb design and flawless mechanical stability achieve the utmost in program fidelity, operating reliability and timing accuracy.



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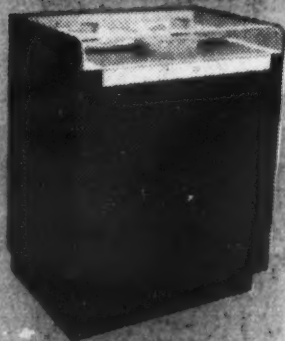
The 350 Series is universally preferred for original and delayed broadcasts, exchanging taped programs, music and drama rehearsals and other performances requiring extensive cueing and editing. Tape editing is remarkably fast with "feather touch" controls mounted within easy reach on a 30°-slanted top-plate. The 350 Series is unusually accessible for installation and servicing, and is available in a variety of tape speeds and mounting styles.



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- Signal-to-Noise — over 60 db.
- Flutter and Wow — under 0.2%.

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The Model 450 is a reproducer which provides sustained high fidelity background music anywhere. It is ideal for the finer hotels, restaurants, department stores, funeral parlors, factories and other users of pre-recorded programs. It plays continuously for 8 hours. Starting, stopping, reversing and repeating can be controlled automatically.



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- Flutter and Wow — under 0.4%.

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**National Citizens Committee
for Educational Television**

NEARLY 20,000,000 AMERICANS have been added in the past few months to those who are enjoying a new television service: noncommercial, educational telecasts that help Americans to satisfy their craving for more learning and, at the same time, entertain.

Two years ago only one of these stations was operating, KUHT Houston. Today thirteen are on the air: Houston, San Francisco, Cincinnati, St. Louis, East Lansing (Mich.), Madison (Wis.), Pittsburgh, Lincoln (Neb.), Seattle, Birmingham, Chapel Hill (N. C.), Boston, and Mumford (Ala.). Eleven additional stations are

being built and in more than 100 other communities some progress has been made toward organizing efforts to build and operate these new outlets.

These are locally owned, locally operated stations that telecast on channels reserved for educational purposes by the Federal Communications Commission. Two hundred and fifty-seven of these channels, which is about 12% of the total UHF and VHF channel allocations, have been set aside.

Any recognized educational or cultural institution, or a non-profit organization, can hold the license to

build and operate an ETV station. However, neither state nor municipal governments as such can do so. The stations must be non-profit, and they are not allowed to sell air time. They must be made available to all educational and cultural institutions within their broadcast area.

Three types of organization and finance typify the stations now on the air: University stations, owned and operated by colleges and universities and financed out of their budgets; state networks, built and run with state funds through an authority; and community stations, the prevalent emerging pattern, built and operated by non-profit corporations with funds from the public, foundations and other institutions. Commercial television has given about \$41½ million in assets to educational television.

Each station is distinctive in its programming in that it attempts to suit the particular needs of the community it serves: 58% of all programs is live. (In a typical 1954 week, 55% of New York City commercial TV was live.)

Adult education in America is much sought after: about 50,000,000 adults are enrolled in some kind of education courses. To help meet some of this demand, adult programming on ETV stations takes up 47.7% of all air time. Family shows are next with 33.3% and telecasts for children, including in-school programs, amount to 19.3%.

Formal courses, the same as those offered by colleges and universities, are an important part of ETV fare. In the past semester, 26 courses

Midshipmen at the U. S. Naval Academy receive classroom instruction via closed circuit television. Under the sponsorship of the Navy Department's Bureau of Ships, a \$250,000 video system was installed there in September, 1953.



were offered by educational stations, among them 16 for full high school or college credit. Language courses accounted for five of the 26, followed by the humanities, history, art, literature, psychology, geography, sociology, business and secretarial. A High School of the Air, telecast over WQED Pittsburgh in the past school year, was the first of its kind on either educational or commercial TV. Students who took the examinations were given credits which lead to high school diplomas and college entrance. At the end of the first semester 71% passed the exams.

For adults there are other cultural courses, some of which may be taken for credit, such as "Shakespeare on TV" with Dr. Frank Baxter. Another fine production is one on archeology called "Here Is The Past."

Public affairs productions are the heaviest single program classification on ETV stations with 7.82% of all viewing time. One of the outstanding of these shows is "Soap Box" over KETC St. Louis. This is a town hall meeting type program in which the issues of the day are threshed out before the cameras. Recently the construction of a new highway was the topic for discussion. After the allotted time of half an hour, the issue was far from being resolved. The moderator asked for and got another half hour on the air to finish the discussion.

Homemaking shows take up 4.8% of programming with a majority of stations airing material which is aimed largely at women. Craft and hobby shows are mostly for men. For youngsters there are delightful programs like "Children's Corner" from Pittsburgh.

There is no network of educational stations in the proper sense of the term. There is, however, an exchange of outstanding programs on kinescope which makes it possible for all stations to share in airing the best in ETV.

In addition to distributing these locally produced kinescopes, the Educational Television and Radio Center in Ann Arbor, Michigan, orders productions from outstanding sources which are then made available to stations. For these services the Center charges a nominal fee to the stations and to other institutions which it serves.

Television is an invaluable teaching tool. Several public school systems, along with the Armed Services, have conducted tests which prove this, but none has been so extensive and exhaustive as the studies that were completed this spring by the U. S. Army



Dr. Edward Teller, "father of the H-Bomb", is the instructor for a series on nuclear physics to be aired shortly over KQED, San Francisco's educational TV station.

Signal Corps at Camp Gordon, Georgia.

Signal Corps Research Contract

The effectiveness and economy of television as a tool for teaching basic and technical subjects was researched for the Army by the Human Resources Research Office of George Washington University, Washington, D. C., on a contractual basis. The research team consisted of Dr. Joseph H. Kanner, task leader, Dr. Richard Runyon and Dr. Otello Disiderato.

Comparison between television and regular instruction under matched conditions showed that television instruction was:

Generally more effective than regular instruction.

Dr. Joseph H. Kanner, Chief of the Training Section, TV Branch, Army Pictorial Service Division, Office of the Chief Signal Officer, was the task leader for the Camp Gordon educational television tests.



Particularly effective for lower aptitude individuals.

Remembered at least as well as regular instruction by trainees of all I.Q. ratings, and even better than regular instruction by those with low I.Q.'s.

Comparing kinescope and regular instruction under matched conditions indicated that:

Kinescope instruction was as effective as regular instruction.

Decreases beyond a certain point in kinescope quality were accompanied by decreases in learning.

The study indicated that kinescopes are effective for reviewing a subject before final examination.

Even after a month's lapse from the time the course had been completed, reviews by kinescope were so effective that trainees scored higher on their tests than they did immediately after completing the course.

The test score of low aptitude trainees receiving the one kinescope review approached those of high aptitude trainees after initial instruction.

These conclusions were reached after a study of over three months was made covering 12,000 trainees at Camp Gordon, Georgia. Camp Gordon was selected for the study of the effectiveness of television for teaching because it had a closed circuit facility and also because it conducted a basic training program.

For the tests, a general basic training company was split into two halves of equal aptitude by using basic Army aptitude tests. Regular classroom instruction was closely duplicated on television. Other than close-ups and some superimpositions, no additional television techniques were

added. Instructors were the same for both regular and TV instruction. To appraise the effectiveness of television instruction compared to regular classroom teaching, trainees were tested immediately and one month after receiving each course.

The 14 hours of subjects taught during the experiment were: map reading, signal communications, mines and booby traps, light machine gun disassembly, defense against air and armor, military justice, squad tactics and M-1 rifle functioning.

These courses involved a range of training material from simple rote learning to performance tasks. Using such a variety of training tasks made it possible to determine later the effectiveness of TV instruction for different types of training material.

Improvements in Learning and Teaching

The second part of the Signal Corps study had four general objectives:

1. To see if television could be used to decrease training time, but also maintain or increase teaching effectiveness.
2. To extend TV training methods from basic to technical subjects.
3. To test equipment such as the Tele-Q.
4. To develop further criteria for the application of television in training.

The second study again used groups matched by aptitude and with the same instructors. Four different hours of electronic instruction in the radio repair course were the subjects taught. The teaching objectives were the same for both regular and TV classes.

However, in contrast to the first test, where the TV instruction was a close duplicate of the classroom session, television in this test was, in effect, turned loose; visual aids, close-up pictures of objects, superimposition of pictures and other TV techniques were used.

In these television presentations, reductions of 30-50% in instruction time were achieved and the effectiveness of the teaching was either improved or was the same as regular instruction.

The use of the Tele-Q, a device which feeds out the text or outline of the instructor's remarks to cue his presentation to him, was highly successful. Inexperienced television instructors quickly became proficient teachers by using the Tele-Q.

Reduced to oversimplification, these



Captain Hugh C. Oppenheimer, Chief of the TV Branch, Army Pictorial Service Division, Office of the Chief Signal Officer, coordinated technical requirements for the Army's TV evaluation tests.

results were achieved by using time most advantageously and taking advantage of television's physical advantages for the lecturer or demonstrator. First, material irrelevant to the teaching objective of the lesson was eliminated. Material having to do with stating the objectives of the course was cut when it was found that this contributed little, if anything, to the end results. The Tele-Q reduced wandering remarks to a minimum. Analogies in teaching material were eliminated when it was found that they were ineffective. Question and answer periods were eliminated and

For further information about educational television write to: National Citizens Committee for Educational Television, Ring Building, Washington 6, D. C.

the questions incorporated into the direct presentation of the instructor. Finally, the logistics, as the Signal Corps puts it, were reduced in television teaching since the cameras and films, not the instructor, do the moving about.

Instructors became increasingly alert to the time-saving moves; they were eager to improve their teaching techniques which under regular conditions would never have come under such close scrutiny.

The marked reductions in teaching time in the difficult subject of electronics has wide implications, not just for the military, but for regular civilian schooling.

For the military, the time saved in basic and technical training is most important, for a trainee spends a large amount of time in training before the Army can use him in his specialty. With TV some of this training time could be reduced.

Refresher courses, important in the military, could be given on kinescopes at low cost and with maximum utilization of the trainees' time. Kinescopes could also be used for trainees who have missed classes because of KP, guard duty or illness.

The implications of the Army
(Continued on page 86, col. 1)

Under the lights of the Southeastern Signal School's television studio at Camp Gordon, Pfc. Robert Jones instructs a class on the intricacies of a portable radio set. SFC James W. Franklin moves the camera in for a close-up.



USAF Communications—Electronics

The first group in a series of articles on communications and electronics in the Air Force. Next issue—Air Materiel Command and Air Research and Development Command

. . . CONAD and ADC

by **Walt C. Wandell**

Editor, Communications & Electronics Digest
Headquarters, Air Defense Command

TO PICTURE ADEQUATELY THE ROLE of communications and electronics in continental air defense, one must consider first the over-all role and modern concept of that form of military preparedness—*air defense*.

A basic interpretation of this concept has been made by General Benjamin W. Chidlaw, former Commander-in-Chief of the Continental Air Defense Command (CONAD) and Commander of the Air Defense Command (ADC), both with headquarters at Ent AFB, Colorado Springs, Colorado. General Chidlaw describes modern air defense as "three dimensional." It encompasses not only the length and breadth of all the territory embraced within the continental United States and its approaches but also the growing "third dimension" of the sky.

Filling Three Dimensions

When we consider that the continental United States covers 3,000,000 square miles of land and is bordered by 10,000 miles of boundary, and that the "third dimension" extends ten and more miles upward, the Gargantuan role of air defense is impressively apparent.

So also is the related role of communications and electronics, which in a very real sense *fills the three dimensions*. For it is communications and electronics which bridge

distances with transmitted intelligence; which extend sensitive nerve ends of electronic perception out into the remotest peripheral areas of danger; and which—through the combined instrumentalities of radar detection, combat guidance, air-ground communications, and airborne electronic fire control—help to exploit the full potential of the third dimension for air defense.

Here are a few specific facts to help complete the picture:

1. Wire communications used by ADC are approximately 500,000 miles long. This total length would be enough to encircle the

globe approximately 20 times. By 1956, this total will have been increased to 600,000 miles, or 24 times around the earth. *ADC is the largest, single user of telephones in the United States.*

2. Approximately 8,300 miles of automatic teletype reporting circuitry are required in a nationwide net to move tactical information from all parts of the country to the ADC Combat Operations Center.

Consequently, it is no exaggeration to represent the C-E role as closely paralleling the over-all mission of air defense. In fact, the C-E function

The compact arrangement of the standard fighter alert wire facilities now being installed at ADC fighter-interceptor squadrons as a C-E project is indicated by this photo. The 507-type PBX, shown at left, is the principal unit in the duty officer's facilities.



Electronics in the . . .

. . . **Continental Air Defense Command
and Air Defense Command, page 30**

. . . **Strategic Air Command, page 36**

. . . **Tactical Air Command, page 38**



Brigadier General Haskell E. Neal, USAF, is the Director of Communications-Electronics for the Air Defense Command. General Neal, who received his star within the past month, is the president of the AFCEA Rocky Mountain Chapter.

has often been pictured metaphorically as the combined nervous and arterial system which sustains and coordinates the far-flung structure of air defense.

Simple to Complex

In the communications and electronics concept, there are dimensions within the three dimensions. Factors involved in the C-E function within

CONAD and ADC run a gamut from the low to the high, from the simple to the ultra-complex, and from one extreme of the North American Continent to the other.

The low, in this sense, is the area which is being filled with electronic defenses against the possibility of extreme low level attack; the high is the utmost combat ceiling where detection and destruction of an enemy can be effected in the trigger-quick terms of modern warfare. From simple to complex, the range extends from a new electronic-acoustic detector for ground observers to the highly intricate command, control, and data-processing systems required to meet the future's threat of multiple air attack with multiple weapons. Lastly, geographical extremes are represented by C-E responsibilities extending from the southern-most part of the United States to the Distant Early Warning Line (DEW) across the Arctic reaches.

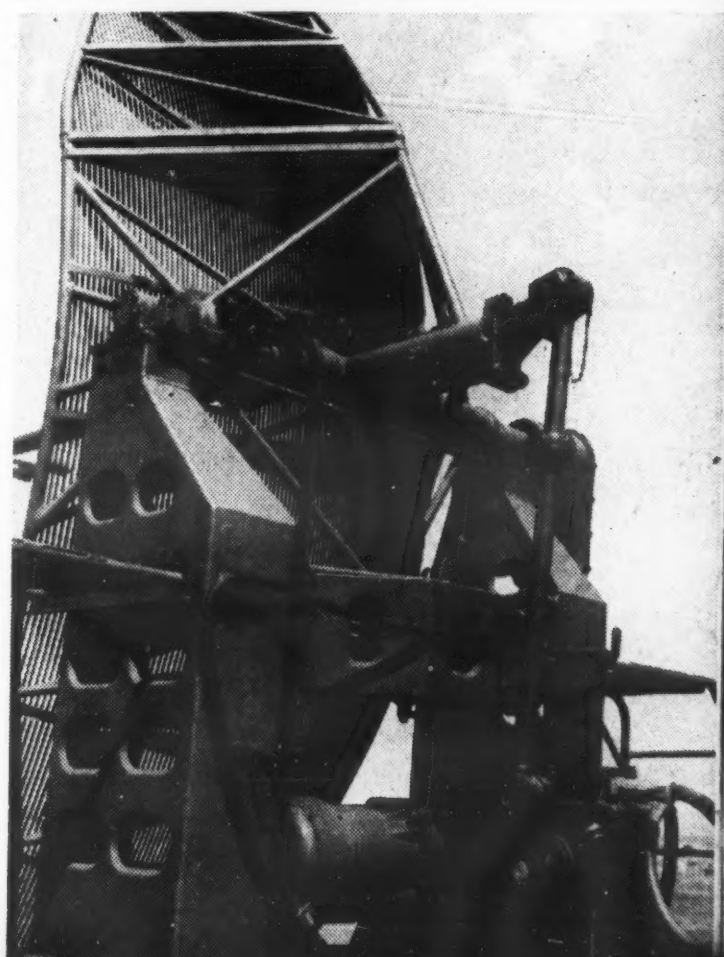
Unattended Radar Sites

Immediately, these dimensions-within-dimensions suggest some of the problem areas being resolved by the C-E organization headed at ADC by Brig. Gen. Haskell E. Neal, veteran Air Force communicator and ADC Director of Communications and Electronics.

One of the recent solutions is the

realization of a gap-filler radar program designed to fulfill ADC's concept of defense in the greatest depth and density possible. This involves the siting and installation of several hundred small, unattended radars which will augment the chain of heavy and supplemental radars already protecting the nation. To solve the problem of unattended operation,

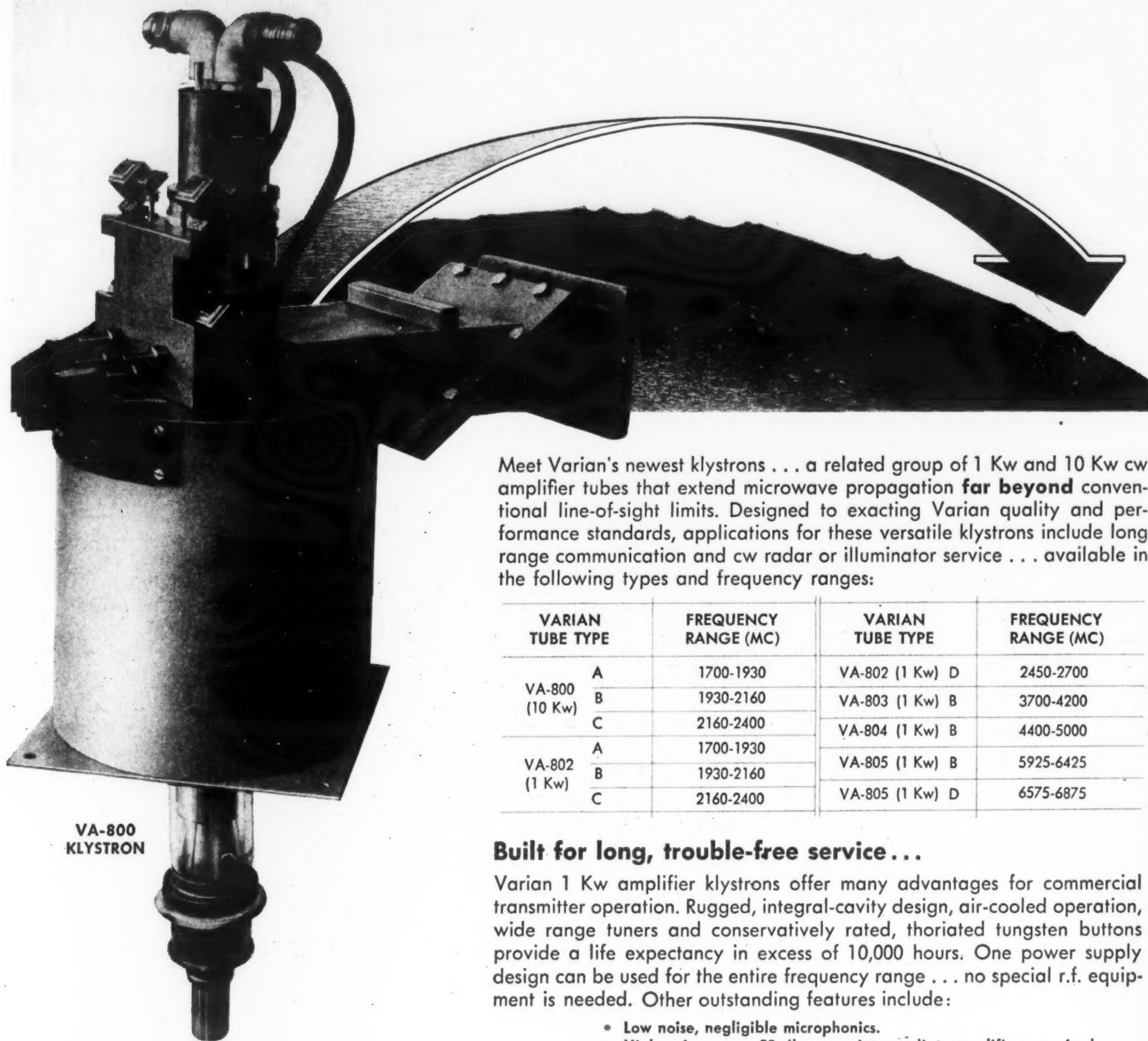
Like a sentinel in the radar fence which protects the continental United States, this nodding-type height finder antenna is an example of the design reflected in ADC's electronic equipments. This antenna is used with three types of height finders, one a mobile version, which are employed in back-up and supplemental roles in the ADC net.



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VA-802 (1 Kw)	A 1700-1930	VA-805 (1 Kw) B	5925-6425
	B 1930-2160	VA-805 (1 Kw) D	6575-6875
	C 2160-2400		

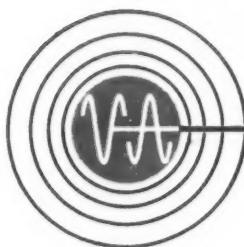
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USAF/C-E . . . CONAD & ADC

of course, has required research and development assistance.

Planning, programming, and siting, however, have been the province of the C-E function at ADC, and the vast job of picking hundreds of locations, best suited to fit into the overall pattern of radar coverage, has been spread over many geographical areas and many individual C-E siting teams.

Needless to say, understanding of radar has increased throughout the rapid extension of the ADC radar concept from its original premises to a well advanced pattern of defense-in-depth. New techniques in planning and siting have been developed, and knowledge of propagation characteristics, lobe configuration, and abnormalities caused by weather phenomena and electronic interference has approached the state of a science which has reflected immeasurably upon improved radar design and the effectiveness of air defense.

Part of this science, General Neal points out, has been the development of radar evaluation techniques which have taken the form of a manual recently published and distributed to the field by the ADC Directorate of Communications and Electronics. Also, Radar Evaluation Flights assigned to various areas have developed advanced "know how" in the site-by-site assessment of radar performance.

Another problem being resolved is the program to improve the heavy

radar network even further so that it can provide the maximum surveillance commensurate with the most advanced air defense concept.

The extreme in simplicity is represented by any number of basic C-E functions. At the extreme of complexity, on the other hand, is coordination in a program of research and development designed to give automaticity and multiple capabilities to air defense command and control through exploitation of modern computer techniques combined with the most advanced methods in data processing, communications, and air tactical control.

Again, since the most advanced concepts in modern electronic science are represented, the C-E responsibility involves an exacting measure of coordination with development agencies. Generally, one of the major effects of such developments on C-E thinking has been what General Neal describes as *a necessary shift away from electronic systems as individual equipments toward system integration as a whole.*

In the geographical area, some of the C-E problems have been widely dispersed. They range from a coordinating responsibility with the Alaskan Air Command in C-E aspects of the Distant Early Warning Line to similar areas in seaward extension of the air defense warning (DEW) system.

Included in the latter are the Airborne Early Warning and Control program, in which "Flying Radar Stations" are being employed to extend the perimeter of warning and

intercept control out over the sea; a program providing for construction of off-shore radar platforms; and radar picket ships being operated by the U.S. Navy as part of inter-service air defense functions under the Continental Air Defense Command.

From the C-E viewpoint, all of these required coordinated planning to determine the best and most effective electronic and communications equipment to be used in essentially compact operations. *The Super Constellations used in the Airborne Early Warning and Control program each carry about six tons of electronic gear.*

Problems Still Present

Since air defense, as much as any other single field, has felt the brunt of a technical revolution bringing a steady march of advances in electronics, there have also been many other problems within problems—not the least of which has been the communications pattern linking all elements of the ADC structure in a smooth flow of tactical information and control centered in ADC's Combat Operations Center.

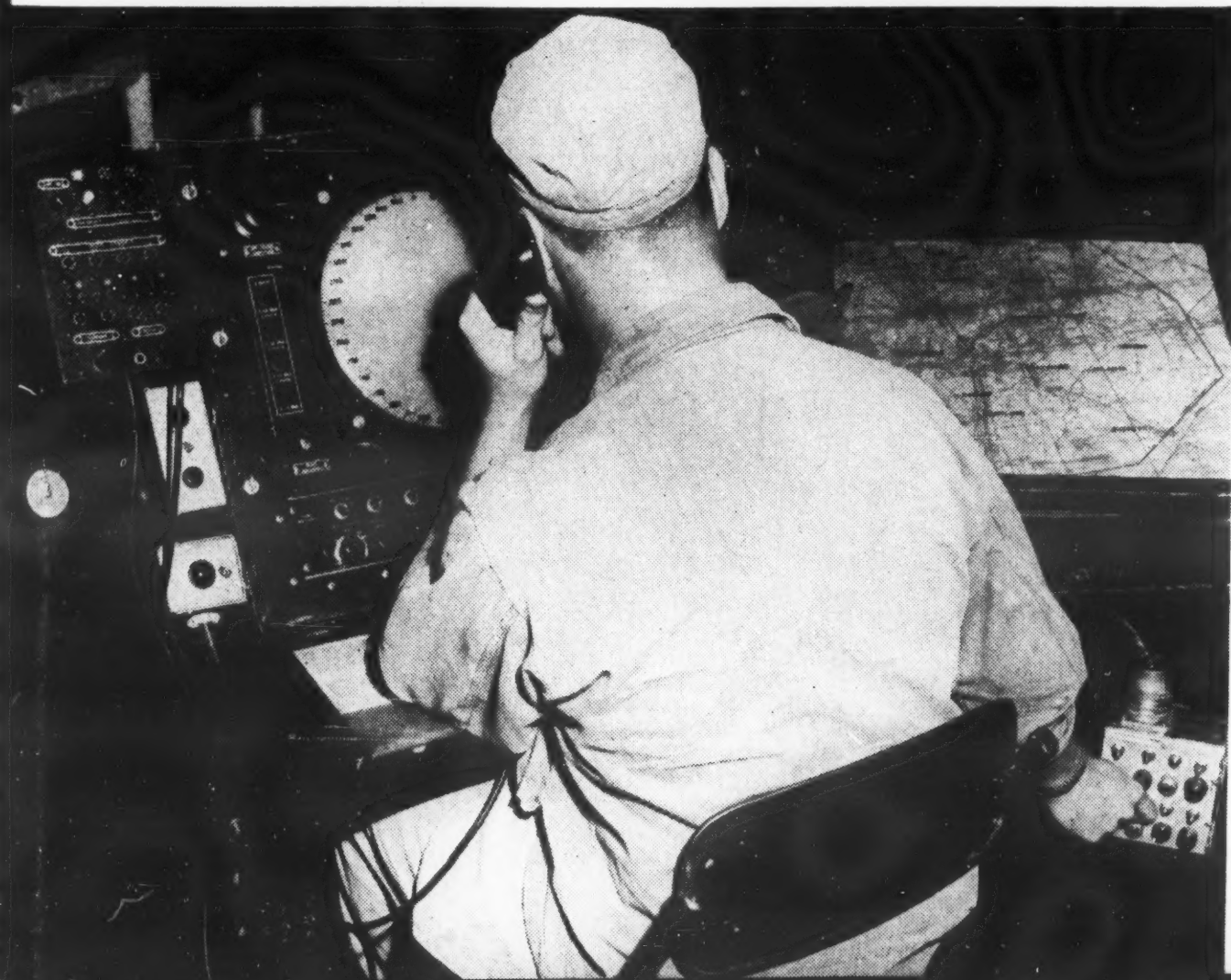
Related, also, have been such problems as conversion to UHF in air-ground radio communications, the development of standard fighter alert wire facilities for ADC fighter-interceptor squadrons, and the development of standard wire terminations for all Aircraft Warning and Control sites.

Currently, ADC is investigating the feasibility of tropospheric scatter radio transmission for certain air defense applications. Continuing problem areas in radio are the shortage of UHF ground-air channels and anticipated troubles in operating many UHF transmitter-receivers in very close proximity.

In meeting such problems, General Neal has an organization centered in the Directorate of Communications and Electronics, a staff agency under the Deputy Chief of Staff for Operations at ADC. This extends through the chain of command to staff C-E organizations in three Air Defense Forces and in the numerous Air Divisions (Defense) which are responsible for sector operations. Over-all coordination, which includes liaison with many other commands, civilian agencies, and industrial contractors producing equipment, is centered in the Directorate at ADC, but integration throughout the command is the keynote in translating C-E plans and concepts into the working mechanism of air defense.

(Turn to page 36)

Intensive training in radar detection and intercept techniques is another ADC requirement. Below, a radar operator at an ADC site is shown using a switching device whereby a synthetic display of targets from electronic target simulator equipment can be channeled into the normal radar scope (Plan Position Indicator).



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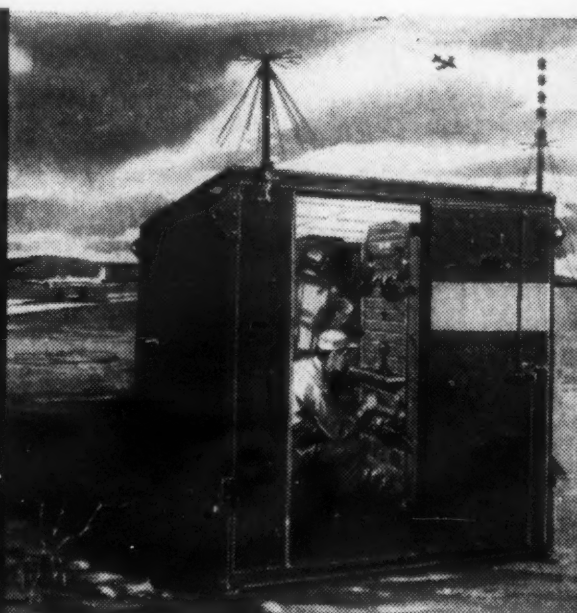


way, anywhere

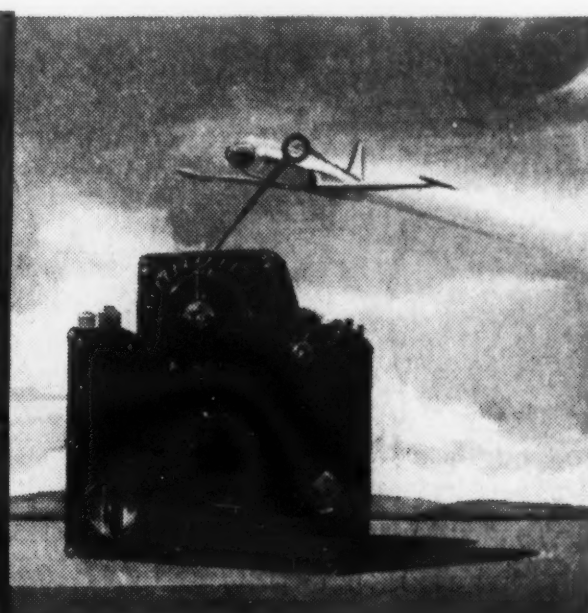
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... Strategic Air Command

by Colonel John B. Bestic, USAF

GENERAL CURTIS E. LEMAY, Commander of the U. S. Air Force's Strategic Air Command, has said, "An air force is the most potent military force, but its efficiency is directly dependent upon effective communications."

As America's long-range atomic striking force, the Strategic Air Command must be prepared at any time to conduct air operations on a global basis. In the event of sudden aggression against this country, SAC's heavy and medium bombers, operating from the United States and from forward bases in other parts of the world, would immediately mount simultaneous nuclear weapon attacks against selected strategic targets inside an enemy's homeland.

In line with SAC's peacetime training program, combat units of the command every day and night of the year are carrying out realistic simulated combat exercises in every part of the world. Complete bomb wings rotate frequently to such overseas points as England, North Africa, and the Far East.

Such a global mission requires an extensive and varied means of communications. Recently a Strategic Air Command B-47 jet bomber flew 21,000 miles and was continuously

aloft for 47 hours 25 minutes without any particularly special preparation. The speed and range which today's aircraft have attained underscore the need for a communications network that is capable of handling a vast number of messages quickly, correctly, and securely.

These facilities may sound very expensive, in terms of individuals and equipment required, but in proportion to the vital need for them, the cost is most reasonable. It has been estimated that the cost of communications in SAC, when the overall cost of aircraft, bases, and other facilities is considered, is comparable to insuring an \$18,000 investment for a one dollar annual premium.

State-side System

Centrally located in Omaha, Nebraska, Headquarters, Strategic Air Command, uses many kinds of communications. To control the three air forces—Headquarters, Eighth Air Force at Carswell Air Force Base, Texas; Headquarters, Second Air Force at Barksdale Air Force Base, Louisiana, and Headquarters, Fifteenth Air Force at March Air Force Base, California—several means are employed. Landline teletype is the



Colonel Bestic has been Chief of the Communications-Electronics Division at Headquarters, SAC since September, 1950. His former assignments include a tour as Chief of the Communications Systems Division, Hq. USAF, in Washington, and a tour with the Communications-Electronics Directorate, Joint Chiefs of Staff Central Control Group.

primary form of communications used in the continental United States. These circuits are leased commercial circuits and their use provides many alternate means of going point-to-point in the event of failure of direct circuits.

This landline teletype system permits movement of a vast number of messages—administrative, logistical and operational. In order to move important traffic, a system of priorities provides guidance to all SAC communications centers, which are manned by military personnel. This priority system is designed to promote efficiency in reducing in-station handling times on priority messages, and in moving all other traffic expeditiously.

In order to insure reliability, alternate and back-up communications are also needed by SAC. These are provided by radio, where landline is the primary means of communications, and by other radio circuits in the case of primary radio circuits.

Communications discussed above are concerned primarily with "hard-copy" (printed messages); however,

Men and machines in the Headquarters SAC Communications Center form a nucleus around which is built a vast, intricate communications network with global coverage. Some 184 airmen and seven officers work in the center which includes a complete cryptographic system, a maintenance shop capable of performing depot maintenance on teletype and crypto equipment, an equipment experimental area, and a global teleconference system.



with jet bombers, voice communication is fast coming into its own as the only sufficiently rapid means of passing information. Printed messages can lead to a problem of processing, clarification, revision or repeat messages. Usually voice, assuming prior intelligence of the matter at hand by both parties, leads to more positive and timely passage of information. Within the continental United States, voice is used extensively by SAC. All stateside Strategic Air Command bases can be reached quickly by telephone facilities which are leased from commercial sources. Telephone circuits to Europe and Alaska are also available through commercial sources.

craft take off. The extremely fast tempo of modern warfare requires positive, rapid and timely communications between aircraft and control centers.

Throughout the United States, the NATO area, Africa and Asia, facilities are maintained by the Air Force, Army and Navy, which permit transmission of instructions through point-to-point ground facilities to a particular air/ground station and thence to a particular aircraft. The continuous improvement in USAF point-to-point communications facilities and the tie-in of air/ground stations at principal points makes it possible for SAC control rooms to contact SAC aircraft anywhere in the world.



A teletype operator working at the Headquarters SAC Communications Center has to know more than just the operating principles of a conventional teletype machine. A major portion of the center's teletype machines is equipped with complex cryptographic systems capable of automatically coding a message as well as decoding it.

All of these communications facilities are tested on numerous command post exercises. SAC operates on the theory that only through continuous, repetitious exercises can a commander determine his capability in time of need. Each exercise has resulted in continuous improvement in handling procedures and timing. The smoothness and sureness of the system is the best that available communications media can provide.

World-wide Contact

Conducting its business on the ground, however, is only one part of SAC's communication job. SAC must also be able to reach its aircraft in the air, since control of a global air force does not end when the air-

craft take off. These air/ground aircraft contacts are made through high frequency (for long ranges) and ultra high frequency (short range) radio. All SAC aircraft are equipped for such communications.

Here is one example of the extent to which SAC's communications system has developed:

Not long ago, a technical deficiency was discovered in several of SAC's F-84 strategic fighter aircraft at a southern U. S. base. At SAC Headquarters in Omaha, the decision was made to ground all F-84s for immediate inspection. Most of the command's fighters were then engaged in normal training operations at stateside bases, and contacting them was no prob-

lem. However, one wing of fighters was executing a mass flight across the Pacific to the Far East, and, according to information in SAC's control center, was at that moment due to depart from Hickam Air Force Base in Hawaii in exactly ten minutes. Instructions to delay take-off, flashed from SAC Headquarters, reached the lead aircraft at Hickam just as it was taxiing out to the runway.

Civilian Personnel Required

In addition to voice and printed messages, the SAC system of communications utilizes photographic or "graphics" transmission. This network operates throughout SAC and numerous overseas installations through leased commercial circuits which terminate on government-owned equipment. This system will eventually provide for the rapid and secure passage of information in the form prepared by the originator. It should also eventually make possible more rapid and accurate transmission of information than is possible with present day equipment and effect considerable savings in the manpower required to run communications centers. The lively civilian interest in this method promises rapid and substantial improvements in techniques.

An interesting side comment on communications in SAC is the fact that if all communications necessary to the conduct of operations in the Strategic Air Command were provided by personnel in uniform from SAC resources, the Commander, SAC, would have no personnel left to fly the bomber aircraft. Stated another way, communications employed by SAC are provided by commercial, Army, Navy, and Air Force facilities with a "safety in numbers" insurance factor. We are less concerned about who provides the communications and more concerned about its dependability and flexibility under emergency conditions.

Crew Delivers Punch

Communications might be considered the sinews of SAC's organization and control. Now let us consider more closely the punch that requires so much organization and control. This is the airplane and its highly-trained crew which must be capable of penetrating deep into enemy territory by day or night, in any weather, and in any part of the world.

(Continued on page 86, col. 2)

(Turn to page 38)

... Tactical Air Command

by Colonel Robert F. Frost, USAF

THE SAFETY OF THE NATION AND the free world would be in jeopardy today if it were not for certain measures being taken to safeguard it. The ranking safeguard is United States air power.

There are indeed few people who are not glibly conversant with this nation's ability to strike back with our strategic air arm at any enemy attempt to attack us or with this nation's efforts toward defense of our country by means of our air defense forces. However, they are thinking mostly in terms of superior aircraft dropping nuclear bombs with pinpoint precision, of guided missiles raining devastation on our attackers and of fast fighter aircraft furiously shooting down attacking bombers. We are well aware of the importance of the minute, but mighty atom.

However, the power of these modern weapons would be dissipated and ineffective without a speedy and precise means of control and direction. In this regard we depend on the exploitation of the electron. Our unaided senses, sight, touch and hearing, cannot cope with the speed and distances of modern warfare. We will depend on electronics for detection

The AN/MPS-11—a ground GCI and early warning radar set.



of our enemy before he strikes us, for guidance of our own retaliatory blows and offensive action and for communications to direct and coordinate the total effort.

Our dependence on electronics is well exemplified in our Tactical Air Forces which are designed, equipped, manned and trained by General O. P. Weyland's Tactical Air Command.

Tactical air forces are designed to meet the enemy threat anywhere on a global basis. *We accept the condition that the enemy will strike first.* It is his choice where such a move will take place. Since it is impossible to determine with a sufficient degree of certainty where the point of attack will come and also impossible to man, equip and locate tactical type forces in every conceivable location in the world, we must have a force capable of moving quickly to any global location immediately upon the commencement of hostilities. Thus we see the vital requirement for the qualities of flexibility and mobility in the units of Tactical Air Command. Hence, *all tactical communications and electronics facilities, systems and equipment must be mobile.* Their weight, size and assembly are designed to be mounted in air transportable trailers.

Electronics for Interception

Let us now look at some typical tactical missions and see how the use of electronics makes their success possible. Tactical air forces are charged with gaining and maintaining air superiority in a theater of combat. To do this we must have an early warning capability of approaching enemy aircraft. Our mobile radar units which can be quickly deployed and moved about with the ever-changing battle situation provide this early warning. This enables our fighter aircraft to become airborne in sufficient time to intercept the enemy aircraft before they do us and our ground troops any harm.

Once airborne, the interception must be accomplished. With the speeds and distances involved, this is virtually impossible with human eye-



Colonel Frost, deputy chief of staff for communications for Tactical Air Command, was commissioned in 1939 from West Point and was commanding the 12th Signal Company in the Philippines at the outbreak of World War II. He served as an Air Communications Officer on several assignments during the war. More recently, he commanded the 1804th AACS Group at Elmendorf, Alaska.

sight alone. Again electronics provides us with the necessary vision. The previously mentioned radar report the location, height, direction and speed of the enemy aircraft to a control center by means of an intricate microwave or radio relay communication system. The controller can then direct or navigate our fighter aircraft to the right place and position for the intercept.

As for the interception of the enemy aircraft itself, the closing speeds and often adverse weather conditions make it difficult and often impossible to shoot down the enemy aircraft by use of open sights and Kentucky windage. Again electronics come to our aid. Radar located in our aircraft, together with modern optical instruments and electronic computers, make it possible to fire accurately and even automatically as soon as the guns are "on target."

Electronic navigational aids such as radio ranges, radio direction finding devices, radio and radar beacons and ground control approach radars assist the pilot to return to his base under the most adverse flying condi-

tions. In addition, there are under development automatic electronic devices to simplify the navigation of aircraft to and from a target. Through a new system of communications known as data link, directions can be given through pulse transmissions to the aircraft. This provides faster and more secure communications. This data link information can be fed into the auto pilot of the aircraft and the plane actually kept on proper course by a radar controller. In addition, the controller can signal the pilot to release his ordnance at the proper time—all by means of electronic devices.

Sentinels at Night

A second portion of TAC's mission is that of interdiction bombing. It is accepted and logical reasoning that, when possible, it is better to knock out enemy troop concentrations, supply dumps, tanks and guns before they are deployed and inflict casualties on our ground forces rather than to wait and exchange fire with them.

In addition to the usual air-to-ground communications provided by radio, the aircraft will be equipped with a radar set, presently under development, specifically designed to find these interdiction targets. This radar set, together with an electronic computing device, will enable the aircraft to accurately select and knock out a desired target whether moving or stationary. The need for this particular type of electronic system was forcefully brought to our attention during the Korean conflict when without it we were limited to good daytime visibility for interdiction bombing. Before this, the enemy has been free to move up supplies at night and during bad weather.

Sometimes when visibility is not suitable and the target is not too far from our front lines, control is accomplished by ground radar. In these cases the aircraft are sometimes guided and controlled by use of the Shoran system. Sometimes a very precise ground radar is used. When this radar is used the controller, who has been especially trained, controls the aircraft from a plotting board inside the radar van. The strike aircraft carries a radar beacon which the radar "looks at." By means of atomic electronic tracking devices and electronic computers the course of strike aircraft is plotted on a map. The controller then has the necessary information to direct the aircraft to the target. These last devices also make possible the effective use of our pilotless aircraft and other guided

missiles, which, not being manned, are completely dependent on electronic guidance and control.

A third portion of TAC's mission, is close support or coordination of effort with our ground forces. Many targets in a combat theater are better attacked by air effort than by ground fire or an infantry charge. This is due to the type of target, its location or its degree or type of defense. It requires extremely fast and precise communications for identification, control and guidance.

It might be noted that TAC's air superiority mission is very like that of the Air Defense Command and the electronic equipment used is similar. Also Tactical Air Command's interdiction mission is similar to the Strategic Air Command's only shorter in range—limited to the theater of operations. The function of close support or coordination with our ground forces, however, is peculiar to TAC alone and requires rather specialized and unique electronic equipment.

Procedure for Strikes

The so-called close air support missions can be divided into two categories: the preplanned mission and the immediate mission. The preplanned mission is handled in much the same manner as an interdiction mission and can, as far as electronics is concerned, be considered a short range interdiction mission which was discussed previously. It is set up in advance, usually the day before, and run off on schedule.

The immediate missions are those that result from the fluctuations or progress of the ground battle. It is

these immediate missions that require particularly speedy and precise communications. When a requirement develops on the front for an air strike, this requirement must be made known to the air elements that will put on the strike. Radio communications are used to get this message back immediately. Sometimes aircraft are airborne on "air alert" waiting to perform one of these immediate strikes. Sometimes the aircraft are on what is known as "strip" or "runway alert," waiting and ready to perform a needed air strike.

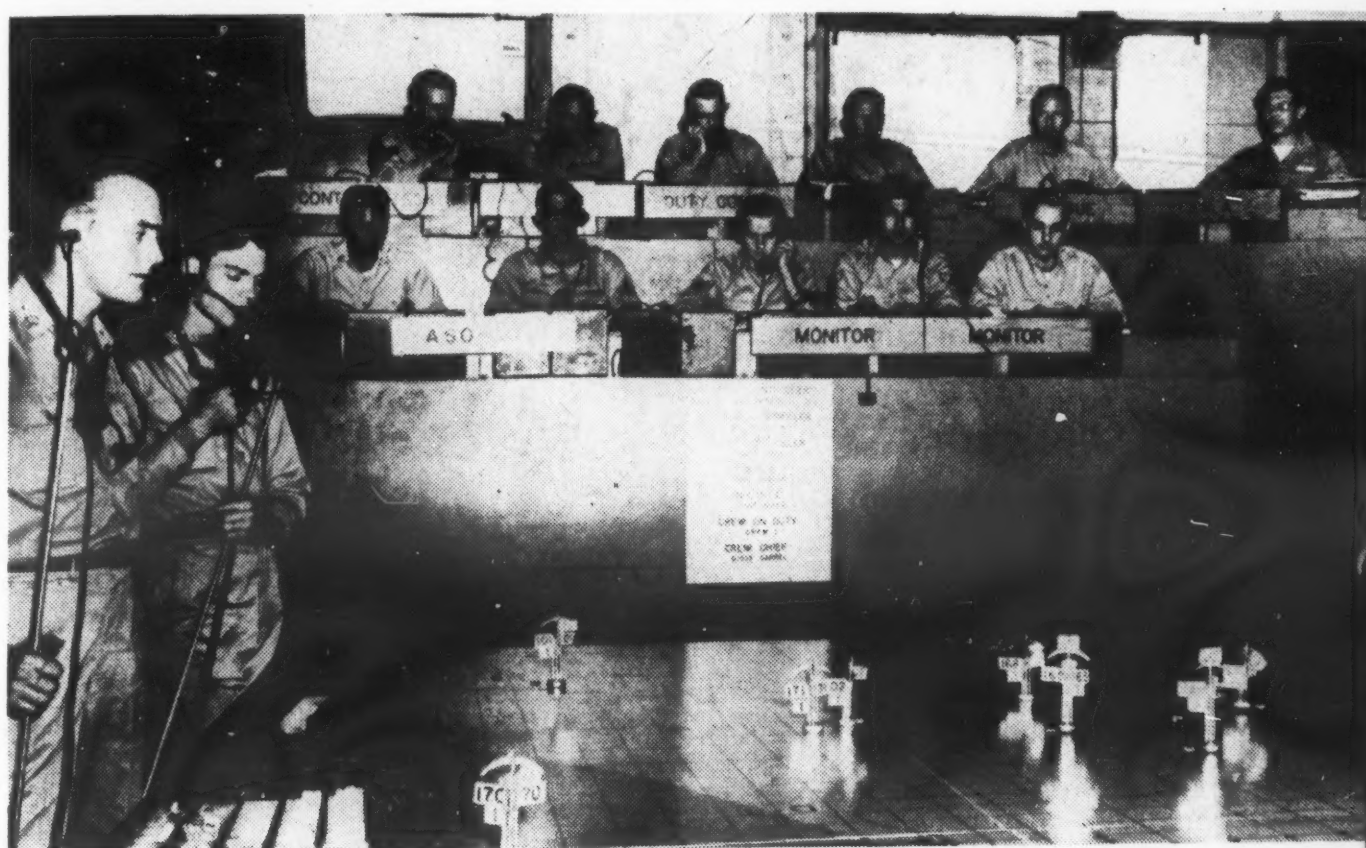
The request for an air strike must be transmitted back to the Joint Operations Center (JOC). After approval, the order for the strike must be transmitted out to the appropriate distant air strip or aircraft on "air alert." Without electronic communications these air strikes could not be performed in time to be useful.

After the appropriate aircraft have been ordered out to make a strike, guidance is required. Because all close air support strikes are in the immediate battle area, where turmoil and confusion are rampant, visual identification of the exact target is almost impossible for the pilot. For this reason air control from the ground is mandatory. This air control can be handled in any one of several ways, all of which involves extensive use of electronics and electronic communications.

Sometimes the Forward Air Controller (an Air Force pilot on duty with infantry units) directs the aircraft visually. Once the control center has turned a particular flight

(Continued on page 87, col. 1)

A Tactical Air Command operation in Korea. Personnel of the Fifth Air Force's TAC center receive up to the minute information from various wings, flights, aloft and forward group observers. Each "stand" represents a flight of friendly or enemy aircraft.



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from textiles to electronics

IF YOU ADMIRE SHEER GUTS AND ARE OF THAT SCHOOL which applauds the champion who rises from the canvas to go on and win the fight then you will take your hat off to Lawrence, Massachusetts, and its 125,000 stout-hearted residents. They wouldn't despair when the life blood of their economy sapped, but met the crisis by administering a series of diversified-industry transfusions until the community now bids to be the most stable and prosperous in the Commonwealth.

Heading the list of new industries, which has transformed this area into a region bursting with high hopes for the future, is the fabulous electronics industry. It has made capital of the highly trained labor market, new plants and the abundant industrial space, the latter available at extremely low cost.

It took more than 100 years to establish Lawrence, Massachusetts as the woolen-worsted textile center of the world. *In less than ten years, this previously one-industry town has changed face and character until now more than 54 varied industries are humming within its confines, each adding stronger fiber to the threads of its existence.*

In the year 1845, far-sighted Yankees stood on the banks of the Merrimack river (second largest in Massachusetts), and from this site of pseudo-wilderness plotted a textile center which would utilize the natural wealth of this then unharnessed stream. In the years that followed, the city of Lawrence and the surrounding towns of Andover and North Andover grew and prospered, mostly from the earnings of this single industry and its related businesses.

(Turn to next page)

by Rear Admiral Thomas F. Halloran, USN(ret)

National Director, AFCEA

as told to Jack McKallagat

Easy access to water and rails made the vacant Pacific Mill #10 a "natural" for the various diversified industries which have moved into the former textile plant.



***the remarkable story of Lawrence, Massachusetts, and its suburbs
(125,000 strong), whose citizens established a healthy economy of
diversified industries even as its textile empire was crumbling***

Textiles—Bread of Community

For generations, the prosperity, aspirations and general welfare of the residents of this community rose and fell in direct proportion to the demands for textile products. There were boom years, when the spindles were purring around the clock and fat pay checks kept industrious workers and their families in sound economic condition. And as the workers prospered so, too, did the shop owners, the businessmen and the professional men. But there were lean years—years when there were more woolen-worsted products flooding the market than the demand could absorb. And work was oftentimes seasonal, since the giant textile factories could produce enough in seven or eight months to meet the usual year's demand. It was a roller-coaster economy. A feast or a famine.

World War II brought the last boom-ride to the top of the coaster when unprecedented military demands for woolen-worsted witnessed the mills operating on three shifts with jobs for all, and the 42,000 textile operators pumping their paychecks into the most prosperous era this area had ever known.

By 1947, the honeymoon was over, and the textile-empire collapse now appeared a certainty. Only a miracle could ever bring the area back to a proximity of its former greatness. The factors involved in the textile industry sickness were many and complicated. Foremost, was the introduction of new synthetic products. Then there was the seduction of considerable of this industry to the southland with free taxes, cheaper labor, community financed structures and other lures as the bait. Many things contributed to the partial demise of the textile industry in New England.

The three mills shown across the top of the picture below are: the Ayer Mills, recently placed on the market for diversified industries leasing; the Wood Mill, largest textile mill in the world with 27 million square feet, also just on the market for leasing, and the Lawrence Print Works, already housing diversified business. In the foreground of the picture is the Monomac plant which has been taken over by the Western Electric Company for the manufacture of telephone equipment.



Whatever the reasons for the recession in the textile industry, it is not important here. The fact is that unemployment of skilled workers reached alarming proportions and millions of square feet of excellent, well constructed industrial properties were vacant.

Lawrence, Massachusetts, was floundering on the ropes. It was groggy from a series of lethal punches that threatened its very existence. Its collective "breadwinner" had lost the source of income. The community family was concerned but never afraid. The mills that had employed more than 40,000 in the peak years were now giving work to 10,000. The weaker segments of the woolen-worsted industry had folded. Only a small part of the empire was now functioning profitably.

Lawrencians are proud people. Almost to a man they love their highly industrialized community which harbors more than 26 nationalities. The same courage and determination which brought these 26 nationalities to Lawrence from all over the world now proved to be the area's greatest asset in its time of crisis.

Citizens Take Active Part

In 1952, a former World War II Colonel, John J. Buckley, still in his thirties, took the oath of Mayor of Lawrence. He established the Greater Lawrence Citizens' Committee for Industrial Development from a group of prominent and representative residents. The Committee hired a full time executive director to implement and sparkplug the measures outlined by the Committee, to establish personal contact with prospective newcomers to the industrial life, and to serve in every way possible the needs and demands of the industrialists now operating in the community as well as those seeking new plant locations.

The Greater Lawrence Chamber of Commerce underwent a reorganization about the same time, formed an Industrial Development Board within its membership, and engaged in a vigorous effort to promote and expand the economy of the community.

The spirit of the challenge caught fire in other quarters. Business and professional men put shoulders to the effort. The Atlantic Enterprises, Inc., was formed by public minded residents who purchased from private funds one of the large but vacant mill properties for development purposes. Another group, The Greater Lawrence Industrial Associates, Inc., came into being with private funds, oversubscribed, and purchased the huge former Arlington Mill properties for promotion and development.

In the brief span which has intervened since early 1952, thirty-five new concerns have located in the area, strengthening the economy with operations in electronics, plastics, paper manufacturing and process, shoe manufacture, garment manufacture, furniture manufacture and

Admiral Halloran, Executive Director of the Greater Lawrence Citizens' Committee for Industrial Development, and his associates have brought many new industries into Lawrence and provided new jobs for the unemployed skilled textile workers.

light metal fabricating, providing jobs for more than 4,000 people.

One of the most notable of these new industries to locate in the area is Western Electric Company, makers of precision telephone equipment. Cautiously, Western Electric moved into the Greater Lawrence area by initiating operations in a former textile building in which it enjoyed success for two years. Pleased with the Greater Lawrence working atmosphere in all of its phases, Western Electric purchased a 150-acre site in nearby North Andover and is now in the process of constructing a \$15,000,000 modern plant in which operations are slated to commence in early 1957. Western Electric is now definitely a permanent and welcome member of the industrial community.

Survey by Western Electric

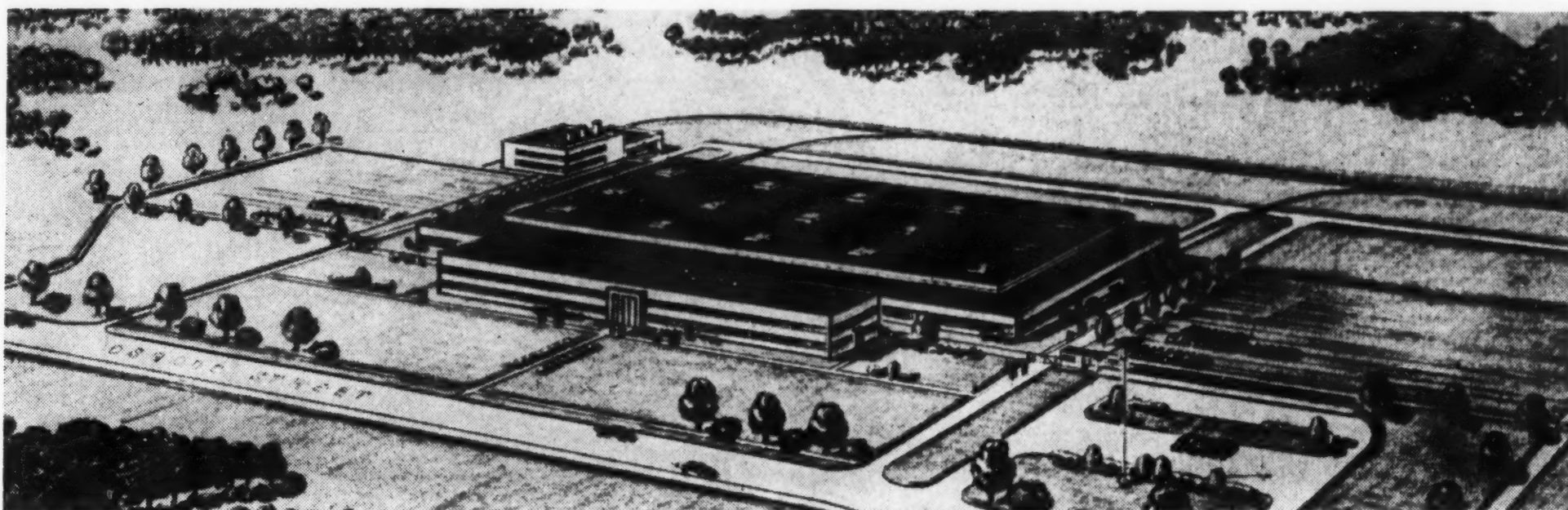
The exacting and comprehensive studies made by Western Electric were flattering to the community and should be of interest to other companies, especially in the field of electronics, searching for a favorable work area in which to locate. The Western Electric report concluded

come with more than 100 years of cultured living. Most important, it is a community with surplus housing accommodations. It is close to the research center of America, being 25 miles from Boston, the hub of engineering talent.

Lawrence is a going concern. It is unlike pioneer areas which offer everything for nothing and when examined closely have nothing to offer. The community's greatest wealth is in its people. It has 125,000 of them in its boundaries.

This community is located in the heart of the manufacturing belt of the northeast United States, which occupies only 1/12 of the country but has concentrated in it half of the entire national market, 70 per cent of the industrial labor force, and the sources of supply of most material and parts used in manufacturing. New England wage levels are generally lower than those of other areas north of Ohio in the growth industries. In the northeast is 54.2 per cent of all U. S. industrial salaries and wages and 72.4 per cent of total U. S. savings. Half of the retail sales in the U. S. are made in a small belt in the northeast extending from Boston to St. Louis.

Industrialists find the transportation facilities offered



Above is the architect's sketch of the Merrimack Valley Plant of the Western Electric Company to be built in North Andover, part of Greater Lawrence. At this new \$15 million plant to be completed in 1957, ultimately 5,000 people will be employed, in addition to those already employed at the Western Electric plant in Lawrence proper.

"The labor force in Lawrence is intelligent, capable and most adaptable. It has been found that former textile operatives possess excellent finger dexterity and good eyesight, qualities so necessary for precision work. We have found that these workers are remarkably adaptable and are willing to learn new skills."

The present program embraces a two-pronged attack at the diminishing problem.

1. The erection of new structures for the larger, more mature concerns in an industrial park which will be favored with all modern industrial attractions, to be located in the southwesterly section of Lawrence and Andover, adjoining the proposed new Route 28, a limited access expressway connecting Boston and New Hampshire.

2. Attract those industries which can easily make use of existing industrial space without major revisions and cater to embryo companies interested in getting a start without an initial large capital investment in plant facilities.

Greater Lawrence is a complete community with a surplus population of skilled workers ready and anxious to be absorbed in employment. It is a going city with paved streets, water, sewerage, schools, churches, hospitals, libraries, theaters, parks and all of the other assets which

on the Greater Lawrence community to be one of its greatest assets. The Boston and Maine Railroad operates a daily schedule of 27 trains between Boston and Lawrence and maintains here the largest railroad terminal north of Boston. Overnight service operates to New York and other major markets with comparable service to Chicago and the Middle West. The area has its own excellent municipal airport, served by Northeast Airlines with daily direct service to New York. Plans are afoot to extend the Northeast service to Miami via New York and Washington. Plane service to many points in the United States or foreign countries is available from the Logan International Airport in Boston which is 40 minutes by automobile.

Within the city are two commercial banks, four saving banks, three cooperative banks, several branches and small loan companies. Lawrence boasts of mature, sophisticated and cooperative labor relations and the unions here are cooperative. The unions have pledged to refrain from any attempt to organize a new company for an appropriate time after its location here in order to provide these new companies an opportunity to establish.

Greater Lawrence has room for many more new indus-

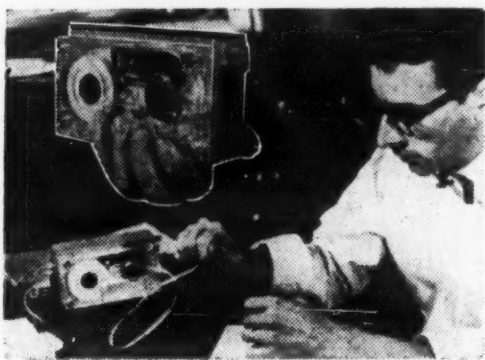
(Continued on page 86, column 1)

ALFAX PAPER—"ELECTRICITY IS THE INK"—AND ALDEN ADJUSTERLESS RECORDING TECHNIQUES . . . OPEN NEW HORIZONS IN DIRECT VISUAL RECORDING

With *Alfax Paper* "electricity is the ink" providing a wide range of tone responses—faithful to the amount of current passed—capable of operating at very slow and very high writing speeds—with low current requirements—entirely new possibilities in the field of direct visual facsimile and instrument recording have been opened up. *Alfax Paper*, wedded to patented *Alden Adjusterless Recording Techniques* which provide the optimum recording pressures and accuracies for fullest utilization of *Alfax Paper*, made possible a new recording method for instrumentation that captures electronic pulses instantly and directly on paper without pens, inks, Cathode Ray Tubes, photography or secondary means and new automatic, continuous facsimile recorders that provide facsimile recording systems that are the fastest, most accurate means of getting information over transmission links today.

ALFAX PAPER AND ALDEN RECORDING TECHNIQUES NOW MAKE IT SIMPLE TO EXPLORE ALMOST ANY TYPE OF INFORMATION FROM THE STUDY OF TRAFFIC MATTERS, OF HUMAN REACTIONS, TO SECURITY CHECKS.

By marking *Alfax* directly with the power that ordinarily is used to swing a stylus or close a solenoid, new simple on-off monitoring type recorders are available. These are free of the problems of adjustment, mechanical delay, supplying ink, etc. Using electricity as the ink, you simply draw the paper past contacts which mark only when there is a signal, with electricity furnishing an endless "ink" supply. Thereby *Alfax* and the *Alden Recording Techniques* make possible very simple recorders than can be set up anywhere by anybody and operate unattended under all environmental conditions.

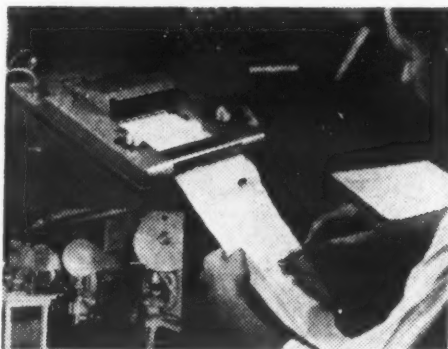


Alden 3-Channel Fact-Finder

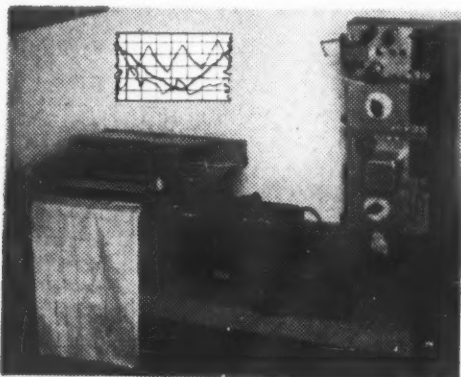
Clerk analyzes record from the plug-in magazine of the Alden 3-channel Fact Finder. "Pocket" recorder can be remotely located or hidden, left unattended for 3 hours up to 8 days obtaining a perfect history of the on-off operation of a truck, a rocket or other phenomena against time.

Here supervisor is remotely getting a quick check of the operation in his punch press department. Recorder operates continuously and unattended, giving a record of up to 30 phenomena. Provides instant visual record of what's happening; permanent historical record that can be consulted later and analyzed in detail; or can even provide the paper memory for direct input into computers for analyses, or be re-scanned for input into servo-mechanism controls for exact duplication of previous pattern of operations.

30-Channel Fact-Finder

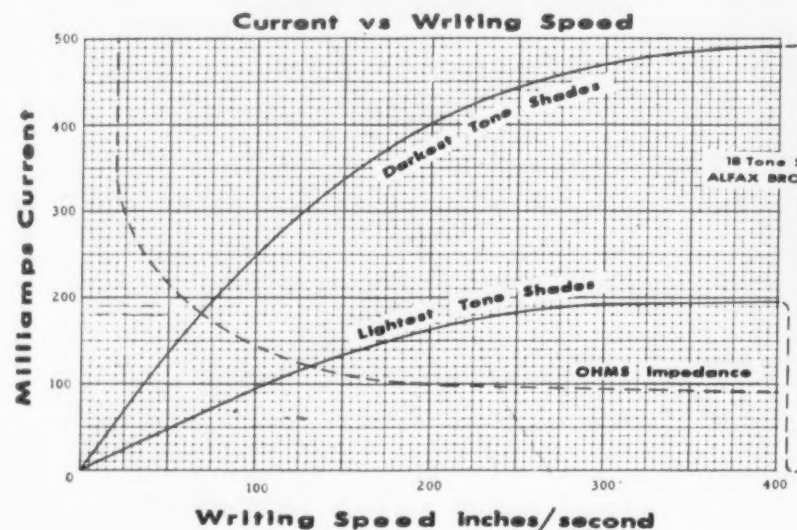


Alfax Paper & Alden Recorder Techniques make possible Automatic, continuous curve plotting



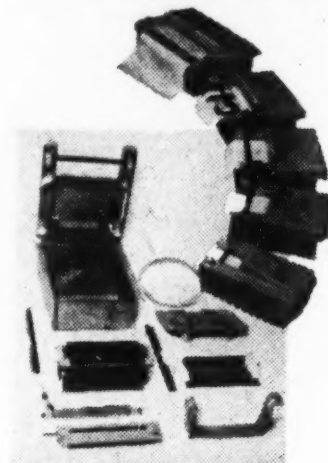
Here *Alfax* paper and the *Alden Flying Spot* techniques make possible a whole new group of recorders that produce its own automatic, continuous graph while plotting any phenomena that can be converted to voltage. Any number of channels can be recorded simultaneously along with standard or reference signals so that the information is instantly and permanently self-calibrated.

ALFAX TYPE 'A' PAPER



The dynamic range of this one basic *Alfax* Type "A" Paper gives you whole spectrum of tone shades without skipping the light at writing speeds from inches per hour to miles per minute . . . all within the power consumption range of a flashlight battery to no greater than ordinary house current.

Alfax Paper and Alden Recording Techniques make possible for the first time direct, visual recordings that capture faithfully the full output of electronic detection devices such as infra-red, sonar, magnetic analysis, scanning.

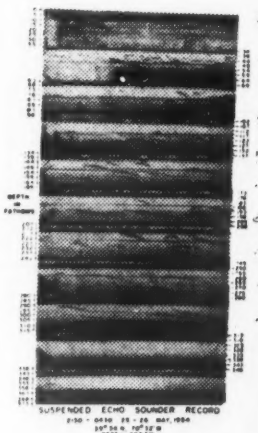


Alden Flying-Spot Recorders

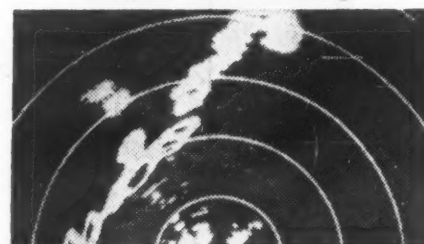
Whereas the signals of most electronic detection devices consist of precise relationships intensities that contain exact information, most output devices lose everything but the lights because the electronic pulses are too fast to operate secondary means such as phosphor screens, magnetic sound generators, to swing pen stylus. *Alfax* paper on the other hand, can up and record everything in the signal: mirror faithfully the intensity of the signal by 18 tone shades; operates at universal range of speeds that permit blowing up the time relationship of events to interpretal size; permits several outputs to be piped in at same plus reference signals. *Alden* techniques in these recorders of simplest construction their operation can be continuous and unattended for hours or days. Components available to build your own and explore tremendous possibilities of feeding electronic signals direct to the flying spot.

Woods Hole Oceanographic Studies

The wide tone shade response of *Alfax* has now made it possible to record up to 13 echo returns from one output pulse of the Echo Sounder. Even when the transducer is placed where the noise ratio is higher than the echo return, they still catch the echo returns as distinct, legible recordings. These versatile, high resolution echo sounder recording systems, designed by the Institute's technical staff around *Alden* 8" and 19" paper width Recorders, record in discreet steps from 6 to 1200 "flying spot" sweeps/min. by merely flipping a switch. They can record whole echo intervals up to 24,000 ft. depths to "look at" the bottom or magnify full scale some interval as small as 25 feet between the surface and the bottom with an accuracy of one part in 30,000. Picture shows first recordings ever made of individual fish life in deep sea scattering layers.



Radar Recording



Alfax Paper has made it possible for one group to record radar directly—without cathode ray tubes or photography.

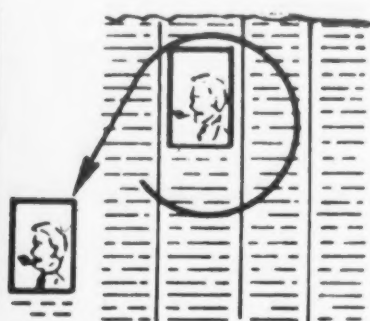
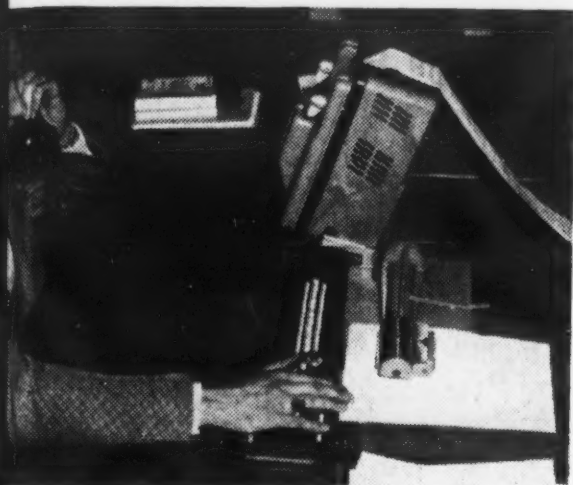
Flaw Detection



Government Arsenal now finds gun barrel flaws heretofore undetectable by direct and instantaneous recording of a magnetic scan using *Alden* Flying Spot Recorders and *Alfax* paper.

ALFAX PAPER, ALDEN FLAT COPY SCANNING AND THE ALDEN ADJUSTERLESS RECORDING TECHNIQUES PROVIDE NEW HIGH SPEED FACSIMILE RECORDING SYSTEMS THAT ARE THE MOST ACCURATE MEANS OF COMMUNICATION.

Alfax has the high speed response at low power consumption which makes feasible facsimile recording at the speeds possible with today's better communication links. The Alden Adjusterless Recorder Techniques make possible continuous, unattended recording at these speeds.



Small copy Selectively Scanned from larger copy.

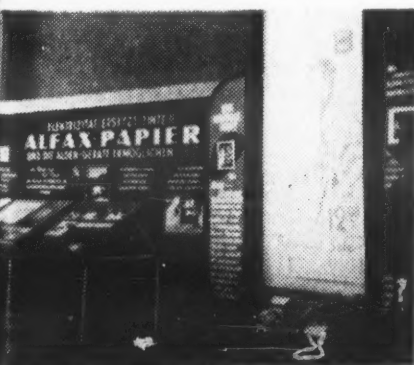
Alden High Speed Selective Dispatch System

Alden High Speed Selective Dispatch System permits selection of pertinent data from any copy—letters, dispatches, and reports—for transmission at speeds up to 72 square inches (900 typewritten, 1800 newspaper words) per minute. Ideal for sending vital bursts of information and commands—it can also send complete reproduction of any copy in strip form. Using Alden flat copy scanning, any size, thickness, or shape copy can be sent. Since Alden continuous recorders automatically start-stop and phase command from the scanner, no attendant is necessary to receive copy. Complete transmitting and receiving station can be installed in a regular business desk, using only 18" x 28" of the top and none of the drawer space.

Alfax Paper and Alden Adjusterless Recorder Techniques Provide Practical Facsimile Bulk Systems.



Sensitivity reaches practical writing speeds even as high as 1/3 of a minute with a writing spot 1/8" square, using power sources supplied by ordinary 115 volt current. For instance, here is the Alden Giant Recorder used for briefing pilots, military personnel or informing passing traffic and ships with late bulletins and emergency information. The Alden Giant Recorder issues up to the minute bulletins 5' wide at the rate of 3 copy travel/min.—enlarged ten times from original copy and supplemented by sound if desired from a remote Alden 5" Flat Copy Scanner. Indoor or outdoor use—can operate under extreme weather conditions.



U. S. Dept. of Commerce Selects Alfax Paper for German Industries Fair

Asked by the Germans to display the most recent technical advances available from the United States, the Department of Commerce selected Alfax paper as a vivid demonstration of the

gigantic technological advances made in the facsimile recording and communications fields by the United States. The hit of the Fair was the Alden Bulletin Board which actually flashed announcements and instructions as pictures on Alfax paper 5' wide emerging at 3 feet per minute showing vivid its application for disseminating propaganda, briefing groups and giving emergency announcements.

ALFAX PAPER AND ALDEN ADJUSTERLESS RECORDER TECHNIQUES PROVIDE CONTINUOUS, AUTOMATIC HI-FIDELITY FACSIMILE TRANSMISSIONS.

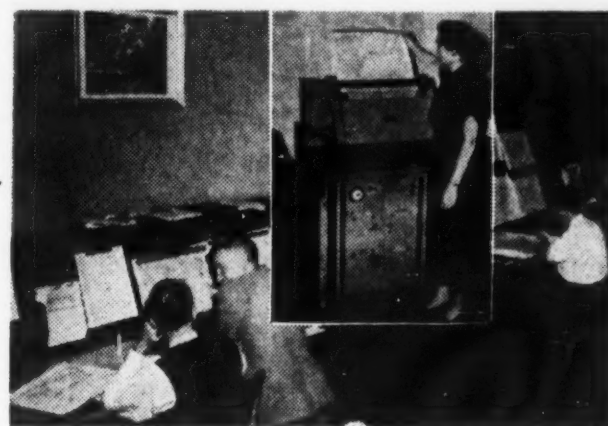


Alden 19" Continuous Facsimile Reproduction System and Flat Copy Scanner

For business and communication use, the Alden 19" Facsimile Reproduction System is readied for production. High quality pictures, complete advertising layouts, blueprints and drawings can be sent with this system. The Alden 19" Flat Copy Scanner takes any size copy, flat or folded, by merely slipping it under a roll on the scanner, and it is automatically recorded by the Alden 19" Automatic Continuous Recorder. De-

signed to operate at speeds suitable for present telephone lines, this system can also be used for high speed duplication or transmission at 15 times the speed over closed loop or microwave circuits.

Logan Airport Station U.S. Weather Bureau Using an Alden Automatic Continuous Weather Map Recorder



The forecasters are enthusiastic over the Alfax maps with their clear, white background upon which they can write and erase, —over the permanent, non-smudging, non-bleeding, recorded image that can be copied without further preparation by the Ozalid or Bruning process. They appreciate the Recorder operating for 50 hours at one loading, odorless, fumeless, and virtually noiseless, and its rugged dependability and easy plug-in servicing features. Now it is possible to use these recorders in conjunction with the Alden 19" Continuous Flat Copy Scanners. Over 10% more weather maps can be sent over the same circuit with the Alden Flat Copy Scanner than with the conventional individual drum loading, and map phasing type scanners—and there is no limit to the size of copy that can be sent.

Specifications of the Alden 19" Automatic Continuous Weather Map Recorder and Flat Copy Scanner

OPERATION: Recorded line 18,850" Paper advance .6 inches/min. Scanning is continuous with tuning fork synchronism. Recorder has automatic stop-start; control timer allows pre-set selection of operation time. Power 110 Volts, 60 Cycles.

CONSTRUCTION: Recorder and Scanner and Electronics furnished in two desk top cabinets on roll away casters 55" high, 32" wide, 22½" deep—or electronics can be placed separately. All electronics on plug-in chassis with front panel "tell tales" for quick, visual operation monitoring.

PAPER: Alfax Type "A" Paper in 170 foot rolls, 19½" paper width. **PRICE & DELIVERY:** Available on rental or direct sales basis.

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Note: For specific information on Recorder Components or Facsimile Equipment shown above, call or write directly to Alden Electronic and Impulse Recording Equipment Company, Westboro 7, Mass.

Quotes in Review

a survey of major
statements made during
the past two months

"The increasing importance of electronic equipment to the Armed Services has placed a premium on its careful design and fabrication. The requirements of the Services are severe, but it must be realized that equipment which does not meet the needs of the Services or does not perform properly when it is placed in operation is a burden rather than an aid. To insure operability when needed, particular attention must be given to the following factors: size, weight, ruggedness; susceptibility to interference, reliability, simplicity of operation and maintenance, and cost.

* * * * *

"The more our success in warfare depends on electronic devices, the more likely it is that these devices will encounter organized jamming efforts from the enemy. To counteract this enemy threat, our engineers are designing equipment that is capable of operating, at least to some appreciable degree, in the face of enemy jamming. Communication systems and circuits also must be designed with this in mind.

"Another factor in the use of modern equipment is that because of the quantity employed in any area, mutual interference problems may develop. Each individual item must be designed to accomplish the greatest practical selectivity, and to operate so that spurious emissions and responses are completely eliminated or at least minimized. In addition, built into the design must be the capability to suppress or shield such "outside" sources of interference as motors, generators, ignition systems, and the like.

* * * * *

"As recently as the Korean conflict, the Army made tremendous gains in the design and manufacture of electronic equipment. A number of items were produced, not only more economically, but more efficiently. Dollars saved in the procurement of a single item, Field Wire WD-1, for the Korean war were sufficient to pay for the total research and development program of the Signal Corps for three postwar years. Incidentally, a million pounds of copper and 22 million pounds of steel per year were saved. And this was done while doubling the effectiveness of our new field wire over that used in World War II."

Brigadier General William P. Corderman,
USA

Deputy Chief Signal Officer, U. S. Army
95th Anniversary of the Signal Corps



"There has been much concern voiced since our announcement of the weapon system concept that such a policy will allow the weapon system contractor to establish control over the development and procurement of equipment, thus providing himself with the opportunity to get into this business. It is not the intent of our weapon system concept to engender such actions; *in fact, the Air Force does not encourage or condone entry into development and production of parts of sub-systems by other than the established industry which normally provides such equipment.* There are a number of compelling reasons why the Air Force believes this position to be sound.

"First, we recognize that to obtain excellence we must take full advantage of the special skills, talents, and ingenuity of the electronic industry. It is through the specialization of segments of our industrial complex that the U.S. has gained pre-eminence in the design and production of our weapons, and we must keep it that way. It is our competitive industrial heritage to continually explore for new and better ways to produce goods. Utilizing this competitive spirit helps insure that we will have weapon systems of superior quality over those possessed by potential enemies.

"Secondly, it is to our advantage to promote a healthy industry not only for reasons of providing our aircraft and equipment needs for a period of extended state of readiness, but for any emergency situation that might arise.

* * * * *

"Another and equally important reason for insuring our electronic industries are afforded opportunities for obtaining business on a fair and equitable basis is to promote competition. I have stated before that our free enterprise system will provide us with excellence in quality of weapon systems. It will, and must, also provide us with products at reasonable cost. The Air Force has been given a public trust of providing America's first line of defense which entails the responsibility for expenditure of more dollars than any government agency or any commercial enterprise in the world. How well we discharge our responsibility to the American people to obtain the most defense for the dollar depends on how well we are

able to utilize the competitive forces in the free enterprise system. We are counting heavily on competition to achieve the economies we must obtain.

"Although there may be some evidence of an occasional breakdown of normal prime-subcontract patterns as we usually think of them, I do not feel that we are witnessing any great or fundamental change in the character of relations between the equipment and airframe segments of the industry. Greater responsibilities have been placed upon the weapons system contractor, but I say most emphatically that this responsibility does not mean that a prime is expected or licensed to undertake the *development or production* of components normally provided by other manufacturers. Neither does it mean that a prime contractor should reduce his subcontract structure or in any other way reduce the participation of their elements of the industry.

* * * * *

"While on the subject of contract clauses, I should also mention that we will continue to include a special clause in all weapon systems contracts which in substance states that the government is not approving any increase by the contractor of his normal manufacturing function, but that we do expect the contractor to increase his management function as required under assumption of the overall responsibility for the weapon system involved.

* * * * *

"As a companion measure to our mobilization base policy, we are taking a closer look at requests for facility expansion. Proposed facility projects over \$1 million are submitted to the Department of Defense for top level review and approval. It is *not our policy to furnish industrial facilities to industry where facilities are available through subcontracting* or where industry should, and can, privately finance such facilities.

"Still another element is the approach to the problem of standardization, a subject with which you gentlemen are very familiar. A vigorous, but controlled, standards program pays terrific logistic dividends as well as simplifying production and cutting costs. Under the leadership of the Defense Department, the services are taking a fresh look at the thousands of items on the drawing board as well as those which fill our supply system with a view toward achieving an even greater degree of simplicity and uniformity. The program will embrace all varieties of equipment from common staple items to highly technical components. We will continue to emphasize recognition of industrial technical standards in our specifications and we intend to adopt commercial items and components to the maximum degree practicable.

"I mentioned a moment ago the *need for close co-operation within the industry and between the industry and the Air Force, and I see standardization as a fertile field in which we can apply mutual emphasis*. To give real meaning to this objective requires that our designers, purchasing people, and the other folks who make the day-to-day decisions think in terms of using standard items wherever practicable. As management representatives, you and I have the task of encouraging their efforts along this line. We are laying greater stress on this area and our buyers will give preference to those proposals which

demonstrate a high degree of standardization without sacrificing performance.

"The missile program presents many opportunities for a closer effort between equipment and missile manufacturers. I can appreciate that some very special technical problems associated with missile development have created a climate fostering uniqueness and individuality of design. However, as these missiles move into the production phase, steps must be taken to introduce producibility, standardization, and to take better advantage of the electronic industry's capacity to produce on an economical basis. Our pool of engineering talent is not unlimited and it seems to me a wasteful thing to expend precious man hours in production design and tooling for a slightly different item where recognized and acceptable substitutes are already available from current suppliers. We will require a broad production base approach as we move into the missile production era, and we will encourage maximum subcontracting of components normally associated with the electronic and equipment industry. Such a program will bring additional segments of the electronics industry into the missile field and will bolster our mobilization base.

* * * * *

"... Although the Air Force development and procurement program for electronics will continue at a relatively high level as compared to pre-Korea, it will be well within the capacity of industry. Therefore, *you may expect to live in a very competitive environment*. The Air Force as a customer will take full advantage of this competitive environment to obtain top quality products at the lowest prices. The contractors who cannot meet these conditions will have tough sledding.

"... As we get our newer and even more complex weapons of the future, we know that the teamwork that now exists between the Air Force and the equipment and the aircraft industries must be developed to the fullest to insure our continued supremacy in air weapons. Each party in this triumvirate must cooperate with the other two parties and recognize each other's importance in our mission to obtain the best combat weapons within the state of the art. The aircraft industry has the job of developing, testing, and producing complete combat weapons. The equipment industry, in close cooperation with the Air Force and the aircraft contractor, has the job of developing, producing, and assisting in the integration of this equipment into the end combat weapon. The Air Force has the job of insuring that the best combat weapons are obtained on a timely basis through its supervision of development and production contracts with the aircraft and equipment industry."

**Brigadier General Thomas P. Gerrity,
USAF**

**Director of Procurement and Production,
Office of the Chief of Staff, Materiel,
Hqs. USAF
AFCEA Washington Chapter Luncheon**



Association Affairs

ANNUAL COUNCIL AND DIRECTORS MEETINGS

At the annual business session of the national convention on May 20th, George W. Bailey was re-elected president of the Association for another year.

Other officers were elected as follows: 1st vice president—Maj. Gen. James D. O'Connell, Chief Signal Officer of the Army; 2nd vice president—RAdm. H. C. Bruton, Director, Naval Communications; 3rd vice president—Maj. Gen. Gordon A. Blake, Director of Communications-Electronics, USAF; 4th vice president—W. Walter Watts, Radio Corporation of America; 5th vice president—George W. Goddard, Bulova Research and Development Laboratories.

Frank W. Wozencraft was elected

Counsel and George P. Dixon was appointed Executive Vice President, Secretary and Treasurer for the 1955-56 fiscal year.

Members of the Executive Committee are: George W. Bailey, Percy G. Black, Maj. Gen. Gordon A. Blake, RAdm. H. C. Bruton, RAdm. Frederick R. Furth, Frederick R. Lack, Maj. Gen. James D. O'Connell, Joseph R. Redman and W. Walter Watts.

The new directors who were elected to the Class of 1959 are listed on page 50.

Action taken included the election of General Omar N. Bradley as an honorary life member of the Association. The dates of the 1956 Convention in Boston were set for May 24-26.

Service Academy Awards

The Association's annual awards at the Military and Naval Academies were donated by the General Electric Company this year and consisted of handsome portable clock-radios. National President George W. Bailey attended the awards ceremony at each academy and made the formal presentation of the AFCEA prize.

The award winner at West Point was John T. Hamilton, the graduating cadet having the highest rating in the study of electricity. (See photograph on cover.)

The Annapolis award went to Thomas Frank Stallman as the graduating midshipman having the highest standing in electronics.

Annual ROTC Awards

AFCEA Gold Medal Honor Awards for the academic year 1954-55 were presented to 142 outstanding senior ROTC, NROTC and AFROTC students majoring in electrical engineering at 97 colleges and universities throughout the country.

The names of the winners will be reported in the September-October issue of SIGNAL.

New AFCEA Chapters

Arizona

Application for charter for the Arizona Chapter, with headquarters at Fort Huachuca, was received and approved at headquarters on May 26th.

Serving as temporary officers of the

new chapter are: president—William E. Feist; vice president—Col. A. L. Burke; secretary-treasurer—Frank A. O. Carolo.

There are already some 65 members in the chapter, many of whom transferred to Fort Huachuca from other AFCEA chapters throughout the country. Formal presentation of the chapter charter will be made by Brig. General Emil Lenzner, Commanding General, Army Electronic Proving Ground, Fort Huachuca, at the inaugural meeting of the chapter.

Philippine

The list of overseas chapters is also increasing, with the Philippine Chapter added in May. Organized through

the efforts of Col. Ira F. Stinson, Director, Communications-Electronics, 13th Air Force, the chapter already has a membership which represents a cross-section of the numerous military and civilian activities in the Philippines.

The following officers have been chosen to head the chapter during its first year of activity: president—Colonel Stinson; vice presidents—Lt. Col. Ernest S. King, 8313th Army Unit (ACAN); Joseph H. Waggoner, International Region, CAA; secretary—John E. Walsh, Philco Corp.; treasurer—Maj. Thomas J. Callander, 14th Communications Squadron (AF).

Official presentation of the chapter charter was made by Major General Francis L. Ankenbrandt, Commanding General, AACS, at Clark Air Force Base on June 14th.

Rocky Mountain

Another new unit of the Association is the Rocky Mountain Chapter with headquarters at Colorado Springs.

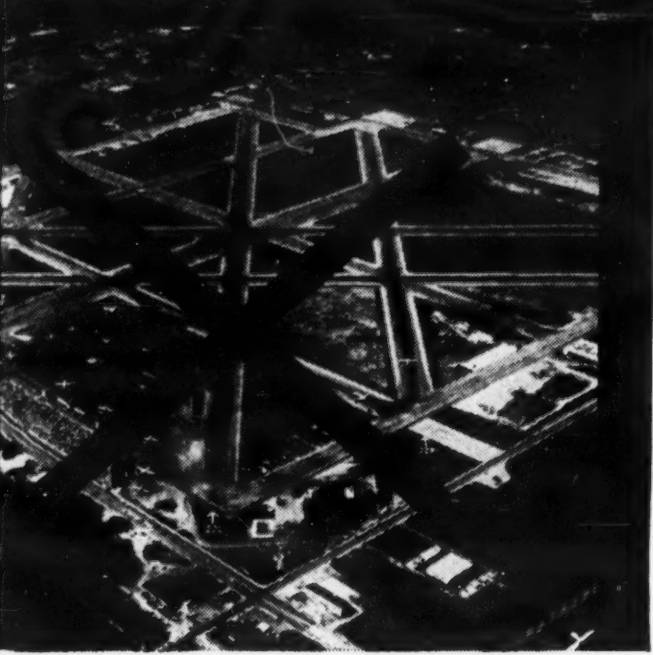
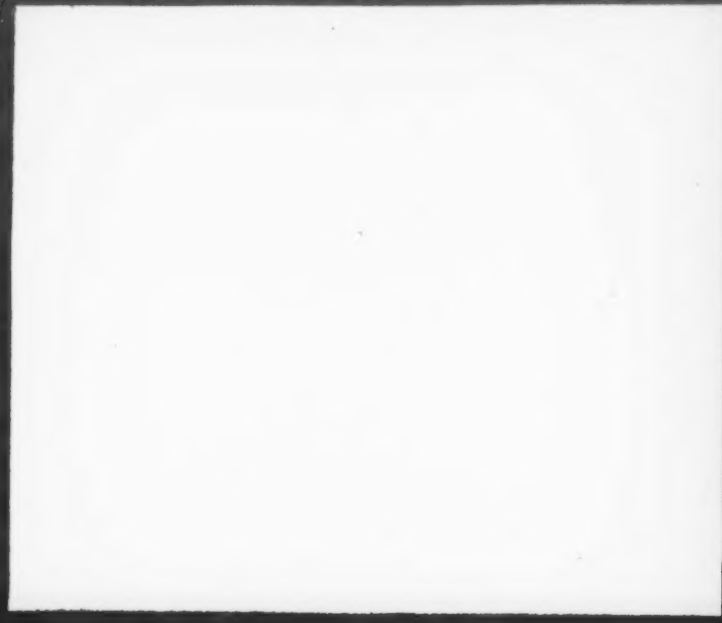
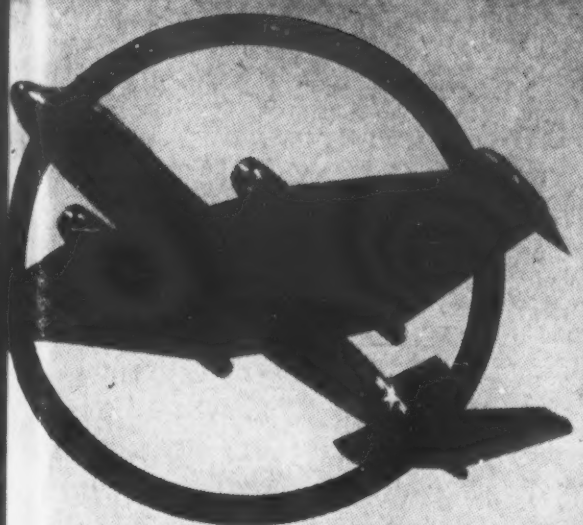
The initial meeting was held on April 19th and was presided over by Major Eugene N. Shaskey, Hqs. ADC, whose efforts were responsible for the organization of the chapter.

The following temporary officers were selected: President—Brig. Gen. Haskell E. Neal, USAF, Air Defense Command; vice presidents—Roland C. Struck, Mountain States Telephone Co.; Lt. Col. Francis K. Nichols, USAF-ADC; and John M. McMenomey, Philco Corp.-ADC; secretary—Maj. Harvey I. Mellion, USAF-ADC; treasurer—Capt. Arthur A. Fox, USAF-ADC.

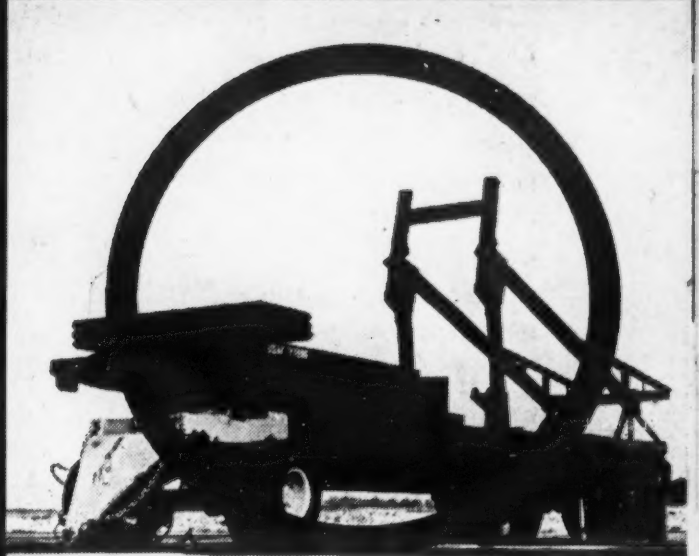
Committees were appointed as follows: Program—Major Shaskey, chairman; William H. Michaels, Philco
(Continued on page 50)

AFCEA National President George W. Bailey presents the Association's award at the U. S. Naval Academy to graduate Thomas Frank Stallman.





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In the event of surprise attack, today's new and more powerful USAF Tactical Air Command can now carry war to the enemy anywhere in the world—around the clock and in any weather.

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In modern warfare, major fixed bases are certain to become targets for initial enemy action. The Martin zero-length launcher makes possible swift mobility and advance-area operation of the TM-61 Matador tactical missile and—if need be—of piloted jet fighters.

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Maj. Gen. James D. O'Connell,
USA*

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USAF*

4th Vice-President

W. Walter Watts*

5th Vice-President

George W. Goddard

Counsel:

Frank W. Wozencraft†

Executive Vice-President

George P. Dixon†

DIRECTORS

1956

RAdm. Henry C. Bruton, USN*
Maj. Gen. Gordon A. Blake, USAF*
Theodore S. Gary
F. R. Kappel
J. Harry LaBrum
Maj. Gen. James D. O'Connell,
USA*
David Sarnoff
W. Walter Watts*

1957

Harry E. Austin
Harry A. Ehle
E. K. Foster
Thomas F. Halloran
Joseph R. Redman*
Robert C. Sprague
John A. Whittle
Frank W. Wozencraft†

1958

George W. Bailey*
Dr. W. R. G. Baker
Theodore L. Bartlett
Percy G. Black*
Donald F. McClure
Fred E. Moran
Leslie F. Muter
Fred J. Turner

1959

RAdm. Frederick R. Furth, USN*
George W. Goddard
William J. Halligan
William Kahler
Frederick R. Lack*
Walter P. Marshall
Ellery W. Stone
Randolph C. Walker

*Executive Committee Member

†Executive Committee Member, non-voting

ASSOCIATION AFFAIRS

Corp.-ADC; and John L. Faber, Mountain States Telephone Co. Membership—Byron E. Thady, Mountain States Telephone Co., chairman; Milton R. Spraker, Philco Corp.—Fort Carson; and Lt. Cdr. James M. Blakeman, USN-CONAD. Publicity—Maj. H. W. DeWald, USAF-ADC, chairman; Ronald R. Marth, RCA-ADC; and Maj. Richard Lloyd, USAF-ADC.

Guest speaker for the evening was Norman Pierce of the Mountain States Telephone Company, who gave an interesting presentation and demonstration on the Bell Laboratories' newly developed solar battery.

On May 9th, during a short visit at Continental Air Defense Command headquarters, Maj. Gen. Gordon A. Blake, Director of Communications-Electronics, USAF, and AFCEA Vice President, presented the official charter of the Rocky Mountain Chapter to General Neal, chapter president, at a luncheon meeting.

Introducing AFCEA's New Group Members American Electronic Laboratories, Incorporated

The AFCEA welcomed as a new group member in May, American Electronic Laboratories, Incorporated, of Philadelphia, Pennsylvania.

Serving in the Association as company representatives will be L. Riebmman, President; J. H. Busser, Head of the Instrument Division; L. J. Breskman, Comptroller; C. J. Fowler, Secretary; R. M. Goodman, Treasurer; B. Haimowitz, Assistant Engineering Director; H. W. Julian, Washington Representative; R. Markowitz, Head of the Communications Division; and M. Nussbaum, Head of the Antenna and Microwave Division.

On May 9th, Major General Gordon A. Blake, USAF, presented the charter of the Rocky Mountain Chapter to Brig. Gen. Haskell E. Neal, USAF, president of the new chapter, at Air Defense Command headquarters, Colorado Springs.



Contraves Italiana

Contraves Italiana, of Rome, Italy, manufacturers in the electronics industry, joined the AFCEA in May.

Those officials of the firm who will be company representatives in the Association are: Dr. Frank Koporossy, General Manager; Dr. Beniamino Caleca, Physicist; Dr. Lanfranco Bartoli, Physicist; Domenico Bagnini, Engineer; Vinicio Rascioni, Engineer; Antonio Pulicheddu, Engineer; Sergio Battaglini, Engineer; Claudio Fondi, Engineer; Aldo Piazzesi, Technician; and Franco Raffaele, Engineer.

Industrial Development Engineering Associates, Incorporated

Another Company to become a group member of the Association in May was Industrial Development Engineering Associates, Incorporated, manufacturers located in Indianapolis, Indiana.

The following officials of the company will be full members under this group membership: E. C. Tudor, President; R. G. True, Treasurer; J. B. Weaver, Secretary; A. C. Elles, Sales Manager; W. F. Sharkey, Sales Manager; R. A. Morris, Engineer; B. V. K. French, Sales Engineer; F. A. Hayhurst, Staff; J. P. Main, Staff; and C. S. Alexander, Factory Superintendent.

North Electric Company

The North Electric Company of Galion, Ohio, electronics manufacturers, is another recent addition to the group membership of the Association.

The company representatives are: Hans Kraepelien, President; Uriah Allen, Field Engineer; R. W. Ayers,
(Continued on page 86, col. 1)

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AFCEA Group Members

Communications—Electronics—Photography

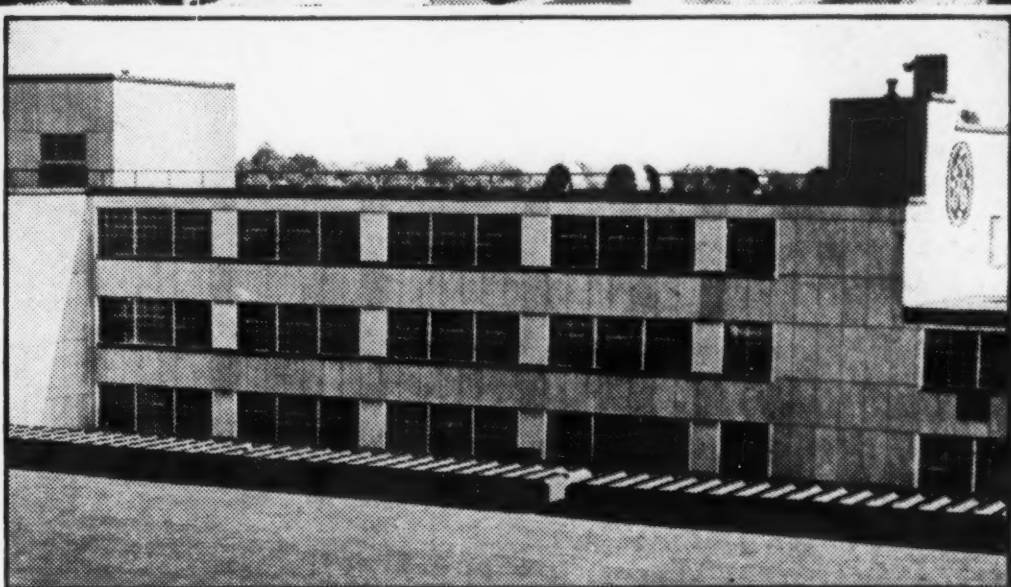
Listed below are the firms who are group members of the Armed Forces Communications and Electronics Association. By their membership they indicate their readiness for their share in industry's part in national security. Each firm nominates several of its key employees or officials for individual membership in AFCEA, thus forming a group of the highest trained men in the electronics and photographic fields, available for advice and assistance to the armed services on research, development, manufacturing, procurement, and operation.

Admiral Corporation	General Telephone Corp.	Plessey Company, Ltd., The
Air Associates, Inc.	General Transformer Co.	Prodelin Inc.
Aircraft Radio Corp.	Gilfillan Bros., Inc.	Radiart Corporation
Allied Control Co., Inc.	Globe Wireless, Ltd.	Radio Condenser Company
Allied Radio Corporation	Gray Manufacturing Co.	Radio Corporation of America
Almo Radio Company	Guardian Electric Mfg. Co.	Radio Engineering Laboratories Corp.
American Cable & Radio Corp.	Hallcrafters Company, The	Radio Frequency Laboratories, Inc.
*American Electronic Laboratories, Inc.	Haloid Company	RCA Photophone, Ltd.
American Institute of Electrical Engineers	Hammarlund Manufacturing Co., The	RCA Victor Division
American Machine & Foundry Co.	Hazeltine Electronics Corp.	Radio Receptor Company
American Phenolic Corporation	Heinemann Electric Company	Raymond Rosen Engineering Products, Inc.
American Radio Relay League	Hercules Motor Corp.	Raytheon Manufacturing Company
American Telephone & Telegraph Co.	Hitemp Wires, Inc.	Red Bank Division
Ampex Corporation	Hoffman Laboratories, Inc.	Bendix Aviation Corp.
Anaconda Wire & Cable Company	*Holtzer-Cabot Division, National Pneumatic Co., Inc.	Reeves Instrument Corp.
A. R. F. Products, Inc.	Hopkins Engineering Co.	Remington Rand, Inc.
Argus Cameras, Inc.	Hughes Aircraft Company	Remler Company, Ltd.
Arnold Engineering Company	Illinois Bell Telephone Co.	Rocke International Corp.
Atlas Precision Products Co.	Indiana Bell Telephone Co.	Saxonburg Ceramics
Audio Products Corporation	Indiana Steel & Wire Co.	Seeburg, J. B. Corporation
Automatic Electric Company	*Industrial Development Engineering Associates, Inc.	Society of Motion Picture & Television Engineers
Automatic Electric Sales Corp.	Institute of Radio Engineers	Sonotone Corporation
Automatic Telephone & Electric Co., Ltd.	International Business Machines	Soundsciber Corp.
Barry Corporation, The	International Resistance Co.	Southern Bell Tel. & Tel. Co.
Bell Telephone Company of Pa.	International Tel. & Tel. Corp.	Southern New England Tel. Co.
Bell Telephone Laboratories, Inc.	Jacobsen Manufacturing Co.	Southwestern Bell Telephone Co.
Bendix Radio	Jansky & Bailey, Inc.	Sparton Radio-Television Division, Sparks-Withington Co.
Berkshire Transformer Corp.	Kay Lab	Sperry Gyroscope Company
Bliley Electric Company	Kellogg Switchboard & Supply Co.	Sprague Electric Company
Bomac Laboratories, Inc.	Keystone Electronics Co.	Stackpole Carbon Company
Breeze Corporations, Inc.	Kleinschmidt Laboratories, Inc.	Standard Coil Products Co., Inc.
Bruno-New York Industries Corp.	Lavoie Laboratories	Standard Electronics Division, Hupp Corporation
Burnell & Company	Leich Sales Corporation	Standard Telephone & Cables, Ltd.
California Water & Telephone Co.	Lenz Electric Manufacturing Co.	Stanford Research Institute
Cambridge Thermionic Corp.	Lewyt Corporation	Stelma, Incorporated
Capitol Radio Engineering Inst., Inc.	Librascope, Inc.	Stewart-Warner Corporation
Cargo Packers Inc.	Loral Electronics Corporation	Stromberg-Carlson Co.
Carolina Telephone & Telegraph Co.	Machlett Laboratories, Inc.	Sylvania Electric Products, Inc.
Central Technical Institute	Magnavox Company	*Technical Materiel Corp., The
Chesapeake & Potomac Tel. Co.	Maida Development Company	Technology Instrument Corp.
Cincinnati & Suburban Bell Tel. Co.	Mallory, P. R., & Co., Inc.	Telephone Services, Inc.
Collins Radio Company	Marion Electrical Instrument Co.	Telephonics Corporation
*Contraves Italiana	Merit Coil and Transformer Corp.	Teletype Corporation
Control Engineering Corp.	Michigan Bell Telephone Company	Texas Instruments, Inc.
Copperweld Steel Company	*Microwave Associates, Inc.	Times Facsimile Corporation
Cornell-Dubilier Electric Corp.	The Montgomery Company	Trad Television Corp.
Craig Machine, Inc.	Motorola, Inc.	Triad Transformer Corp.
Crosley Division-Avco Mfg. Corp.	Mountain States Tel. & Tel. Co.	Transistor Products, Inc.
Dana, P. A., Inc.	Muter Company, The	Transitron Electronic Corp.
Designers for Industry, Inc.	Mycalex Corporation of America	Tung-Sol Electric, Inc.
De Vry Technical Institute	National Company, Inc.	United States Rubber Company
Diamond State Telephone Co.	Nelson Technical Enterprises	United Telephone Co.
Dictaphone Corporation	New England Tel. & Tel. Co.	United Transformer Co.
Downing Crystal Company	New Jersey Bell Telephone Company	Vectron, Inc.
Dukane Corporation	New York Telephone Company	Voltz Brothers, Inc.
DuMont, Allen B., Laboratories, Inc.	*North Electric Company	Waterman Products Co., Inc.
Eastman Kodak Company	Northwestern Bell Telephone Co.	West Coast Telephone Co.
Electronic Associates, Inc.	Oak Manufacturing Co.	Western Electric Company, Inc.
Electro Tec Corporation	Ohio Bell Telephone Co.	Western Union Telegraph Co.
Elgin Metalformers Corporation	O'Keefe & Merritt Company	Westinghouse Electric Corp.
Espey Manufacturing Co., Inc.	Otis Elevator Co., Electronic Division	Weston Electrical Instrument Corp.
Farnsworth Electronics Company	Pacific Mercury Television Mfg. Corp.	Whitney Blake Co.
Federal Telecommunication Laboratories	Pacific Telephone & Telegraph Co.	Wickes Engineering & Construction Co.
Federal Mfg. and Engineering Corp.	Packard-Bell Company	Wilcox Electric Co., Inc.
Federal Telephone & Radio Corp.	*Page Communications Engineers, Inc.	Willard Storage Battery Company
General Aniline & Film Corp.	Phebeco, Inc.	Wisconsin Telephone Company
General Cable Corporation	Phelps Dodge Copper Products Corp.	Wollensak Optical Company
General Communications Co.	Philco Corporation	Zenith Radio Corporation
General Electric Company	Photographic Society of America	
	Polytechnic Research & Development Co., Inc.	

*Company accepted for AFCEA Group Membership since the last issue of SIGNAL.



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G-E high-reliability subminiatures are produced in a separate 5-Star Tube building—under dust-free conditions

By removing lint and dust—chief causes of intermittent short-circuits—General Electric has cut inoperatives among 5-Star Tubes two-thirds. 100% factory tests show this increase in *built-in* tube reliability!

Separate 5-Star premises and facilities—apart from the rest of the G-E tube factory—help make possible the manufacture of subminiatures that meet the most critical standards of military dependability.

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TECTIVE hoods, glass-paneled for work observation. Employees wear rubber finger cots—changed every hour—to avoid contaminating tube parts with dirt or moisture.

As a result, G-E 5-Star subminiatures and miniat-
ures are the most reliable tubes you can install! Throughout manufacture, their quality is guarded by special G-E techniques and processes developed for 5-Star Tubes alone.

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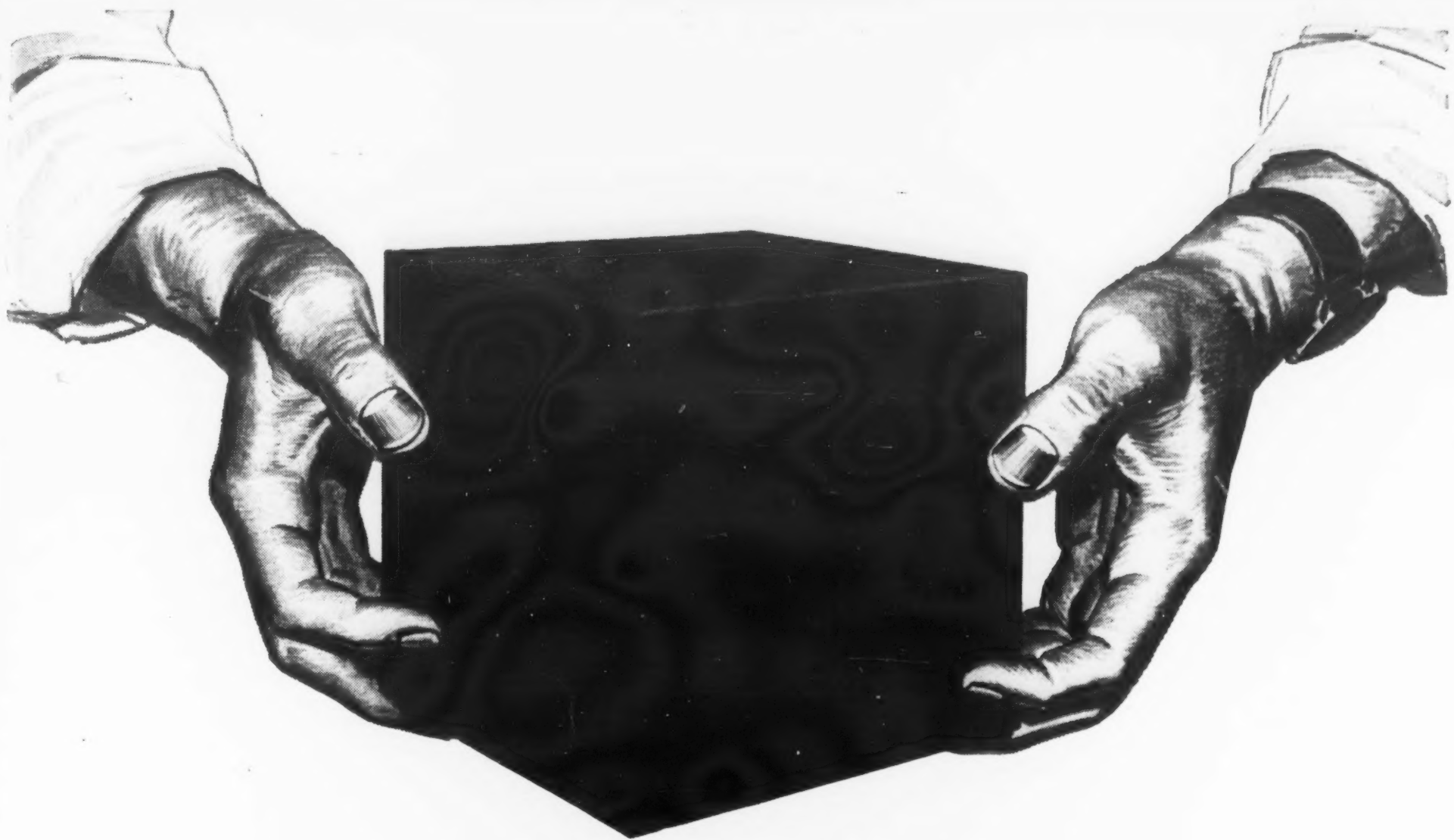
AFCEA CHAPTERS—National Director of Chapters: Maj. Gen. James D. O'Connell, USA

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Chapter News

Chapter of the Year—South Texas

Augusta-Camp Gordon

Captain Milton E. Ballard of the Signal Corps Training Center addressed the April 21st meeting on the subject of "The Back Door to China". His talk covered some of the lesser known areas of China in which he had served and was illustrated by many interesting slides.

During the business session, committee reports were submitted by Col. Thomas A. Pitcher, membership chairman; Col. Lowrey R. Moore, civil defense chairman; Maj. Moore, member, house committee; and Maj. H. B. Raff, acting chairman, program committee. Mr. F. A. Saxon, chairman of the communications section, Augusta Area Civil Defense Organization, reported briefly on the general civil defense activities of the district.

Program feature of the May 19th meeting was a timely talk on "Power for Peace" by Col. Lowrey R. Moore, SCTC, a vice president of the chapter.

Following dinner, guests and new members were introduced. The new members were Capt. Walter G. James and Capt. Malcolm E. Morris of The Southeastern Signal School.

Baltimore

A series of interesting tours featured the chapter's spring program of activities.

On March 29th, chapter members and guests visited the Bendix Radio Division of Bendix Aviation Corporation and on April 19th a tour was made of the new Cockeysville plant of Aircraft Armaments, Inc.

A dinner meeting at Johns Hopkins University on May 17th was followed by a tour of the university's new electronics lab.

Boston

Ninety-seven members and guests met at the Hanscom Air Force Base, Bedford, to hear Dr. James T. Killian,

President of the Massachusetts Institute of Technology, speak on "America's Problem of Keeping Pace with Russia in the Development of Engineers."

Dr. Killian pointed out that the current graduating class at M.I.T., totaling 800, has had 6,000 interviews by representatives of industries seeking engineering talent. Although Russia passed the U. S. in 1952 in its output of engineers, Dr. Killian does not think that we should engage in an academic numbers race for, he said, there is a need for more quality rather than quantity in engineering talent.

The growing question, Dr. Killian said, was whether or not Federal aid could provide the answer to the problem of supporting an expanded educational program. He stated that the incentive for teachers is another knotty question, particularly as many teachers leave the field of education to enter industry as a result of greater incentives offered there. One solution to the problem of the shortage of teachers was offered in the suggestion that industrial talent which is required to retire at 65 might provide a pool of teachers for technical institutions.

The following new officers were elected: president—Gardiner Greene; vice-presidents—Frank Lyman and Fred Moran; treasurer—William Melanson; secretary—Louis Dunham; directors—David Hull, Raymond Meader, Paul Hannah and Capt. Donald C. Beard, USN.

Dayton-Wright

In April the chapter deviated from its customary schedule of technical programs and staged a dinner dance at Levitts Restaurant in Dayton on the 29th. Seventy-six members and guests turned out for a most enjoyable evening.

Decatur

A lecture-demonstration of Intrafax,

Western Union's "picture" method of communications by facsimile, was the highlight of the April 28th meeting at the Decatur Signal Depot. The program was conducted by Lee Lenzini, local Western Union representative.

A picnic in Galloway Park, Decatur, on May 26th, concluded chapter activities for the season. Regular meetings will resume in the fall.

Detroit

Recent meetings of the Detroit Chapter consisted of a tour of Western Union facilities in the Detroit Office, and a visit to the Detroit Artillery Armory for a Signal Corps display of the latest communications equipment for ground forces.

Election of officers took place at the annual business meeting on April 29th at the Olde Wayne Club, with Hallam W. Thompson of Western Union chosen to head the chapter.

The other new officers are: vice presidents—Joseph W. Swartz, Seneca Electric Company; Lt. Col. Robert J. Martin, Director, C&E, Hqs. 30th Air Division; and D. S. Cotter, Michigan Bell Telephone Company; secretary—J. R. Saxton, Michigan Bell; assistant secretary—H. A. Dawson, Michigan Bell; treasurer—R. A. Berkfield, Michigan Bell; assistant treasurer—J. H. White, Michigan Bell.

Fort Monmouth

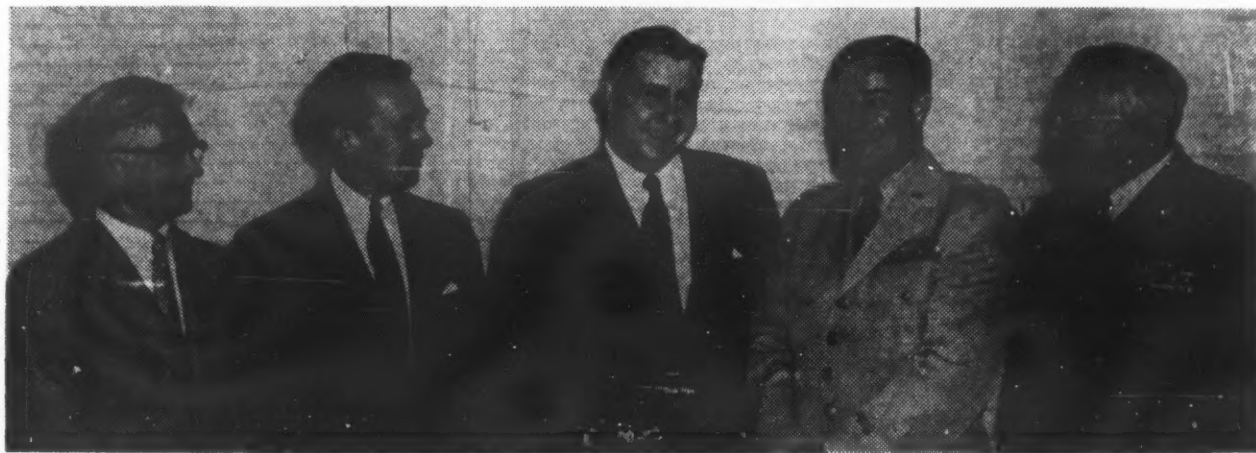
"Nike", the electronically-guided missile, and its role in the defense of the United States, was discussed by Col. Raymond S. Zimmer of the New York Telephone Company before the April 28th meeting at Gibbs Hall.

Colonel Zimmer, who has been with the Bell System for over thirty years, said a major gap in our nation's defense is being filled by Nike. "We have realized that a single plane carrying a single bomb can do more damage than all the planes on all the bombing missions in World War II," he told the 500 members present. "Something to combat this was necessary—thus the development of Nike."

Colonel Zimmer traced the history of rockets through demonstrations and films. He said the anti-aircraft defenses of World War II would be totally inadequate today "where every missile fired has got to get to the target", and added that the ring of Nike defenses is one of the ways of offsetting the manpower differences between the U. S. and its potential enemies.

By means of a demonstration, the speaker showed how radar picks up an attacking plane and the manner in which Nike is fired and controlled to intercept and destroy the plane.

Shown at Boston Chapter's May meeting: l to r, Paul F. Hannah, chapter director; David R. Hull, retiring chapter president; Dr. James R. Killian, president of M. I. T., guest speaker; Maj. Gen. Raymond C. Maude, commanding general, Air Force Cambridge Research Center and Capt. John Gallaher, Professor of Naval Science, Harvard University.





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CHAPTER NEWS

Hawaii

The Air Force was host to chapter members and guests at Hickam Officers' Club on May 25th. Following luncheon and the election of officers, a very informative talk on "Air Force Global Communications" was given by Major Clifford Brokaw, after which a film "Which Way for Germany" was shown.

The newly elected officers are: president—Louis W. Robello, Hawaiian Telephone Company; vice presidents—Col. Wilmer Randall, USAF, Col. George P. Sunshine, USA, and Cdr. Arvell B. Ward, USN; treasurer—Mary Evans, NavCommSta; secretary—Henry A. Pente, Hawaiian Telephone Company.

Kansas City

Colonel J. D. Lee, Assistant Deputy for Operations, Central Air Defense Force, was guest speaker at the April 19th meeting and discussed the structure and mission of the Continental Defense Command.

The following slate of new officers was elected for the 1955-56 term: president—Col. Carroll S. Miller, Wilcox Electric Company; vice presidents—Col. Gus B. Hoffman, Grandview Air Force Base; C. L. Foster, Central

Technical Institute and R. E. Conrath, American Telephone and Telegraph Co.; secretary-treasurer—Robert W. Lee, Wilcox Electric Company.

Board of Directors: Dee Adams, United Telephone Company; J. V. Wilcox, Wilcox Electric Company; C. L. Buell, Western Union Telegraph Company; Lt. Cdr. H. J. Kaczmarek, U. S. Naval Air Station, Olathe; A. J. Esrey, American Telephone and Telegraph Co.; E. L. Parkington, Western Union; Glenn Rider, Rider & Philpott, photographers; E. W. Abend, Southwestern Bell Telephone Co.; W. R. Wheeler and E. C. Laird, American Telephone and Telegraph; A. B. Steward, Southwestern Bell Telephone.

The chapter's May 27th meeting was addressed by Major General Gordon A. Blake, Director of Communications-Electronics, USAF, on the Subject of "Present and Future Military Communications Problems."

Held at Grandview Air Force Base the meeting was attended by 140 members and guests, a new attendance record for the chapter. A conducted tour of the base, demonstrating Air Defense facilities, preceded the evening's program.

Col. George Dixon, Executive Vice President, was also a guest of the chapter and reported on the events of



Detroit Chapter members met at the Detroit Artillery Armory recently for a display of the latest Signal Corps equipment. Inspecting radio set ANTRC-24, above, are (l to r): Leigh Taylor, Barron Clemons, Herman Sorem, Harry Fisk, Deloy Monroe, Frank Norton, Donald Owen and Fred Baker. Members shown below are (l to r): Keith Knutson, Albert J. Thomas, George H. Goldstone and Paul J. Schafer, retiring chapter president.



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CHAPTER NEWS

the recent national convention in New York.

London

Guest speaker at the March 31st meeting was Alexander W. Montgomery, Joint General Manager, Standard Telephones and Cables Ltd. His subject was "Where Do We Stand Today in the Use of the Transistor".

Mr. Montgomery discussed the general field of transistor development and emphasized the practically unlimited capability of the transistor in the electronic field.

The discussion primarily showed what happens when a new discovery is let loose in the development field before it has been realistically tested and evaluated. Mr. Montgomery pointed out that although the transistor blossomed in 1948 with great expectation from all in business, for many reasons it failed to become as important an element in the production of electronics systems as was first anticipated. But once it had gotten rid of the super-enthusiasts and returned to a realistic combination of continued research and

Standard Telephones and Cables Ltd.; J. J. Eades, Automatic Telephone and Electric Ltd.; A. G. Clark, Plessey Co. Ltd.; Sir Louis Sterling, RCA Photophone Ltd.; secretary—Maj. Russ C. Foss, MAAG-UK; associate secretary—L. T. Hinton, Standard Telephones and Cables Ltd.; treasurer—George Ellsworth, U. S. Embassy; associate treasurer—P. A. Turnor, RCA Photophone Ltd.

After the business meeting, a short film on production of reliable tubes was shown, with introductory remarks by Hugh Malleon of Mullard Ltd. This was followed by a general discussion of the progress and requirements of the reliability program for military electronic equipment.

Highlight of the meeting was the exchange of messages with the national AFCEA convention in session in New York City. The messages were transmitted by American Cable and Radio Corporation as part of their demonstration during the communications pageant. Rear Admiral Ellery W. Stone, USNR, president of American Cable and Radio Corporation, was present at the London Chapter meeting and took part in the transoceanic communications.

and, to show the change in air warfare, presented documentary films on Pearl Harbor, Hiroshima, Eniwetok and Nike.

After touching on the long distance telephone system, radar and artillery computers, Col. Zimmer used models to simulate air search radar and Nike in action. He explained that the missiles will never be fired in launching areas except against raiders. All practice "shoots" take place at the White Sands Proving Ground.

The speaker concluded his talk on a warning note, telling his audience that completion of metropolitan area defenses have been delayed dangerously by the objections raised by communities which have not understood the relationship of these Nike launching sites to the possible survival of the United States in the age of the thermo-nuclear bomb.

The current crucial situation in the Formosa area is directly attributable to "our failure to win the Korean War," Admiral Joseph J. Clark, USN (Ret.), former commander of the Seventh Fleet, told members at the April 27th chapter gathering.

Admiral Clark, who is a vice president of the Radio Receptor Company, stated that "our waging the Korean War was entirely necessary. It did stop aggression, but its conclusion was completely unsatisfactory." He declined to comment on Administration policy in the Far East, or to name those responsible for the failure to win a conclusive victory.

A pioneer aircraft carrier man and a pilot since 1924, the Admiral said that one of the chief lessons derived from the Korean conflict concerned the potential value of the guided missile. "Developments in this field," he pointed out, "will save lives and improve both our offensive and defensive methods of combat. Guided missiles will not, however, replace the aircraft carrier and other time worn and proven methods of waging warfare." He also emphasized that "the importance of electronics in modern warfare cannot be over-estimated. As much as anything else, mastery in electronics will determine the outcome of the cold war."

Admiral Clark illustrated his talk with dramatic movies of naval and air action during the Korean War.

North Texas

A tour of Texas Instruments, Inc., on April 25th proved to be one of the most successful chapter meetings to date. Members observed the manufacturing processes of transistors, as well as many other items produced for both communications and geophysical surveys.

The company's functional management organization for growth was explained to the group and two interesting films were shown: "Work Simplification" and "Geophysical Operations in the Amazon Area."

Following the tour and dinner, Dr. Gordon K. Teal, Assistant Vice President of Texas Instruments, discussed the future of the transistor and manu-



Kansas City's May 27th meeting at Grandview AFB was addressed by Maj. Gen. Gordon A. Blake, Director of Communications-Electronics, USAF. Pictured above, are (l to r): Chapter President Carroll S. Miller; Paul Goldsborough, General Communications Manager, TWA; AFCEA Executive Vice President George P. Dixon; Alexander J. Esrey, General Manager, Western Area, AT&T Long Lines; General Blake; and Maj. Gen. Jarred V. Crabb, Commanding General, CADF.

development on applications, we have continued to discover new and amazing capabilities in this new electronics device, the speaker said.

Following the talk, a discussion period took place on the current applications of the transistor in electronics production—both in the U. S. and the U. K.

The meeting was held in the U. S. Embassy Theater and was attended by seventy members and guests.

At the chapter's annual meeting on May 19th new officers were elected as follows: president—Brig. Gen. Samuel M. Thomas, USAR, Hazeltine Electronics Corp.; vice presidents—Capt. H. E. Ruble, USN; Lt. Col. J. T. Tyler, USAF; Lt. Col. Norman Fertig, USAF; Lt. Col. F. P. Russo, USA; associate vice presidents—Sir Thomas Spencer,

New York

More than 300 members and guests attended the March 30th meeting at the Hotel Shelburne, New York City. The program feature was a talk on the guided missile "Nike," by Col. R. S. Zimmer of the New York Telephone Company.

Tabbing Nike "a suburban weapon," Col. Zimmer went on to explain it is a "last-ditch" defense that must be located in the area it protects. He emphasized that in order to protect areas in which Nike launching sites are located, the Army does not handle loaded missiles, except in the event of attack. Fuel and warheads are stored in underground bunkers.

Col. Zimmer discussed Nike's relationship to the Air Force fighter-interceptor screen and anti-aircraft batteries

facturing industries in this field. Dr. Teal supplemented his talk by demonstrating several transistor devices which were formerly operated by the conventional vacuum tube.

During the business session, the following were elected to the chapter's Board of Directors: T. E. Manning, Western Union Telegraph Company; Col. T. F. Yates, SigC, USAR; R. T. Shiels, Anaconda Wire & Cable Co.; G. A. Krone and J. H. Layman, SigC, Fort Worth General Depot.

The American Telephone and Telegraph Company and the Southwestern Bell Telephone Company played host to 58 chapter members and guests while they toured the eight-floor toll office in Dallas on May 23rd.

Included in the tour were lecture-demonstrations of the following operating centers:

Television operating center—here members learned how the telephone company personnel control and coordinate the vast nationwide television network to feed stations in the Southwest in accordance with operation orders from the broadcaster. Radio relay (microwave) operating center—lecture-demonstrations were given on the system used to carry television network programs as well as hundreds of voice channels simultaneously. Mobile radio telephone control center—general mobile radio telephone service to the public was described in detail while members observed the maintenance control equipment. Automatic long distance dial equipment—while hundreds of calls were being placed direct to telephones in distant cities, members learned the general principles of the automatic control equipment.

Also included in the tour were the coaxial cable carrier system, the maintenance alarm systems (microwave and coaxial cable carrier systems), and the long distance traffic operating center.

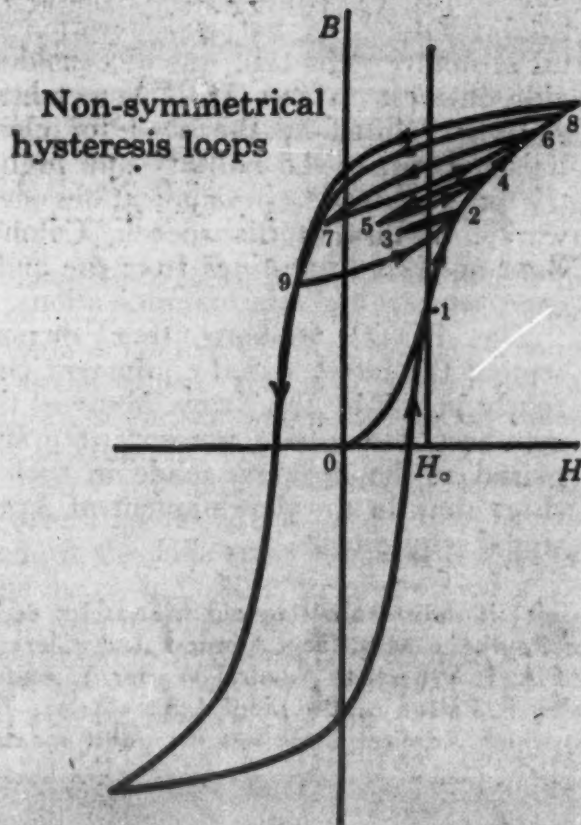
The tour was followed by a business meeting and dinner during which Chapter President Howard L. Housley reported on the events of the national convention which he had attended in New York.

Paris

The chapter's annual meeting at the Cercle Militaire on April 27th was addressed by Dr. Maurice Ponte, General Manager of the Compagnie Generale de TSF and Compagnie Francaise Radio Electrique, who presented a realistic and impressive program on the subject of "Television and Radar."

Dr. Ponte explained the possibilities of associating radar techniques with those of television, and his talk was supported by a "live" demonstration which included the utilization of a long-range "diversity" type radar at Pontoise, approximately 30 kilometers from Paris. A special aircraft was flown for the purpose. Received radar signals were transmitted via microwave to the Eiffel Tower, and the PPI picture transmitted from there via television. The television presentation was projected on a large screen at the

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CHAPTER NEWS

Cercle Militaire. Direct radio communication with the aircraft was also provided.

A new slate of chapter officers was elected for 1955-56 as follows: president—Joseph R. Pernice, Chief, Electronics Division, NATO International Staff; vice presidents—Maj. Gen. E. Blair Garland, Chief Signal Officer, SHAPE; Rear Adm. J. N. Wenger, Director, Communications-Electronics, Hqs., U. S. European Command; Alexander de Bondini, Vice President, International Automatic Electric; secretary—Lt. Col. F. V. Diehl, Signal Division, SHAPE; treasurer—Robert O. Duport, telephone engineer, SHAPE.

The dinner-meeting was attended by 122 members and guests, with an especially noteworthy turnout from Headquarters, Allied Air Forces Central Europe, at Fontainebleau.

Pittsburgh

Some 100 members visited the Pittsburgh Works of the Jones & Laughlin Steel Corporation for a tour of the steel mill early in the year. Safety helmets were issued to everyone and the Safety Director of the Pittsburgh Works briefed the group on precautions to be taken during the tour.

Highlights of the tour were: the open hearth furnace where the members saw the furnaces tapped with an explosive charge and the molten steel run out into huge ladles and cast into ingots; the blooming mill and soaking pits, where 15 ton ingots were heated and rolled into slabs; the electrical control room which demonstrated the application of electronics to a manufacturing operation; and the scarfing yard where acetylene torches burned off surface impurities on the rolled slabs.

An informal meeting and discussion period followed the tour, with officials of Jones & Laughlin answering questions concerning the various operations.

The Continental Can Company was host to the chapter on March 31st. After viewing a colored cartoon motion picture on the packaging industry the members were taken on an inspection of the plant.

The various phases of operation in-



Paris Chapter's annual meeting was addressed by Dr. Maurice Ponte, General Manager, Cie Generale de TSF. Shown above (l to r) are: Arian H. de Goede, retiring chapter president; Dr. Ponte; Joseph R. Pernice, newly elected chapter president, and L'Ingenieur General Combaux, Chef du Service des Telecommunications d'Armement.

cluded the lithographing of the metal sheets, cutting, stamping and assembling of cans and containers. The 400-can-a-minute automated manufacturing and assembly line was a vivid example of the application of electronics to a manufacturing process.

On April 26th, the chapter met at Carnegie Institute of Technology to hear an address by Col. Charles M. Baer, Signal Officer, Second Army, and to witness an ROTC demonstration. Arrangements for the program were made by Capt. Horace R. Smith, Assistant PMS&T, who introduced Colonel Baer, the staff of the Military Science Department and the ROTC cadet officers.

Colonel Baer discussed the organization for telecommunications from JCS level through the national governmental structure. His talk was of considerable interest to the AFCEA members since it pointed up the need for close liaison between the military and industry in worldwide communications networks. Following his speech, Colonel Baer answered questions from the audience concerning telecommunications.

The ROTC students then demonstrated the latest signal equipment currently in use by the Army. Many of the members and guests present were surprised at the progress made in such a short time in the development of Army signal equipment.

Sacramento

Seventy-five members and guests met at the KCCC-TV Studio on April 11th, with Brig. Gen. Clarence P. Talbot, chapter director, as host for the evening.

The program included a conducted tour of the studio and transmitter facilities. Paul Meek, Chief Engineer for KCCC, explained how "network," "film" and "live" shows are put on the air. In addition two motion pictures were presented—one showing the development and construction of the atomic-powered submarine *Nautilus*; and the other a film produced by General Electric on the development of the new type turbine generators.

San Francisco

The University of California at Berkeley was host to the chapter on March 26th and presented an outstanding program.

Following dinner at the Men's Faculty Club, the group of over 100 was escorted to the Radiation Laboratory auditorium where a lecture on some of the electronic aspects of the cyclotron and bevatron was given by a member of the Radiation Laboratory staff. Mentioned too was the research program being conducted at the University, its principal theme being the investigation of the fundamental aspects of physical science. The speaker pointed out that, as the program and facilities expanded, interests spread beyond the field of physics into chemistry, biology and medicine. The present research effort extends quite broadly over the entire range of basic research on the fundamental physical and chemical properties of matter and the application of radioactive substances to problems in biology, medicine and related fields.

The audience was told that, during wartime, the laboratory was engaged under the Manhattan Engineer Project in the development of an electromagnetic isotope-separation process. This work led to the construction of a large plant at Oak Ridge for the electromagnetic separation of uranium isotopes. The government sponsorship of research has continued on a large scale

Admiral William F. Halsey of IT&T (second from left) is shown renewing old friendships as he talks with (l to r) Admiral Roy W. M. Graham of Raytheon Mfg. Co.; Admiral J. J. Clark of Radio Receptor Co.; New York Chapter President A. E. Wharton; Admiral Walter S. Anderson of Automatic Electric Co., and Admiral Stanley F. Patten of Du Mont Laboratories. The reunion took place following the April meeting at which Admiral Clark was the guest speaker.



under the Atomic Energy Commission so that the Radiation Laboratory is now almost completely supported by the AEC through a contract with the University of California.

Located in Berkeley at the present time are the bevatron, the 194-inch synchrocyclotron, the 60-inch cyclotron, the 330-Mev linear accelerator with its associated 4-Mev Van de Graaff accelerator and the 32-Mev linear accelerator with its associated 4-Mev Van de Graaff accelerator. Design work is well underway for a heavy-particle linear accelerator. In Livermore (the Laboratory's second site), there is a Cockcroft-Walton accelerator in operation and a 90-inch cyclotron nearing completion.

At the conclusion of the lecture, the chapter members were escorted in small groups for a tour of the facilities of the Laboratory. Each group was led by a staff member who explained the operation of the various machines and what could be accomplished. The most interesting machine which attracted the attention of the AFCEA

membership chairman, during which the aims and objectives of the AFCEA were brought out.

During the dinner-meeting, Chapter President C. L. Wickstrom gave an enthusiastic account of the proceedings of the national convention in New York and Fort Monmouth.

San Juan

The chapter's special project to provide the blind with electronic equipment for cueing purposes is advancing satisfactorily. At a recent meeting, Paul A. Girard, chairman of the committee charged with this task, reported that a type of hearing aid receiver had been located which could be adapted to serve the purpose, and that six had been ordered from the manufacturer. A special transmitter will be designed and built and it is expected that the complete equipment will be ready for presentation within a few months.

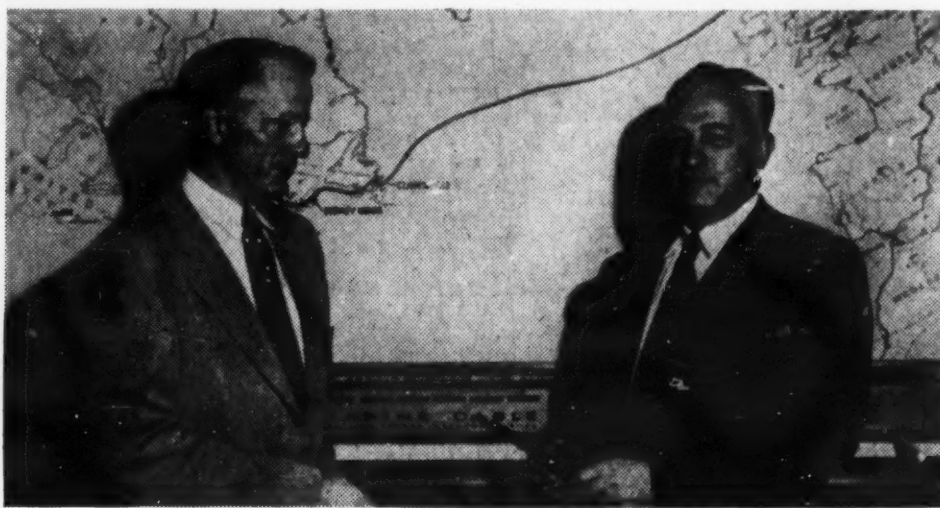
Mr. L. A. Fritchman, Vice President of International Telephone and Telegraph Company, was guest speaker at one of the spring meetings. He dis-

Using Rockets." Feature of the May 6th meeting was an illustrated lecture on "The Trans-Atlantic Telephone Cable" by Mr. C. C. Duncan, General Manager, Special Projects, American Telephone and Telegraph Company, Long Lines Department.

Mr. Duncan, who is directly in charge of the installation of this trans-oceanic cable, gave the chapter a vivid description of the project. The cable is a joint venture of the Bell System, the British Post Office, the Canadian Overseas Telecommunications Corporation, and the Eastern Telephone and Telegraph Company, and is expected to provide a clear, reliable, multiple-channel telephone hook-up between the two continents. There will be two undersea cables, each 1,950 nautical miles long, and 118 "repeaters" will amplify the sound at regular stages along the route.

The speaker also described some of the engineering problems which had to be solved before construction could get underway.

Guest speaker at the June 3rd meet-



Scott-St. Louis Chapter. Shown at the June meeting at left are (l to r): William W. Alvis, Western Union Telegraph Co.; Chapter President Harry L. Cooper, AT&T Long Lines; Brig. Gen. W. Preston Corderman, Deputy Chief Signal Officer, guest speaker; and Col. Gomer Lewis, past president of the chapter. Photo at right shows President Cooper and Mr. C. C. Duncan, General Manager, Special Projects, AT&T Long Lines, featured speaker at the May meeting.

visitors was the bevatron. The weight of the magnet used in the bevatron for particle acceleration is 10,000 tons and the maximum energy stored in it is 20 kilowatt hours. Peak power input is 100,000 kilowatts and maximum magnet current is 8,000 amperes. The frequency injection system operates at 380 kilocycles and the radio frequency power generated approaches 30 kilowatts at 20 kilovolts.

The May 26th meeting featured a family night smorgasbord dinner at the San Francisco Mart Club and a private showing of a live television show at the American Broadcasting Company studio.

Mr. J. A. Barkhurst, ABC Publicity Manager, was host for the evening. After an entertaining description of the earlier history and present day trends of television broadcasting, Mr. Barkhurst conducted a tour of KGO Television Studios and arranged a studio party for the group to watch the popular live television show "San Francisco Tonight." Don Sherwood, star of the show, concluded the program with a televised interview between himself and W. R. Patton, San Francisco Chapter

cussed the research being conducted in the capability and adaptability for commercial use of form and scattering transmissions. He also conducted a question and answer period at the close of his talk.

Twenty members visited Ramey Air Force Base on April 16th for a luncheon at the Officers' Club and a tour of the base, including inspection of a B-36. Arrangements for the program were made by Kinne D. Prachel.

Scott-St. Louis

Capt. Joseph J. Gallagher, Director of the St. Louis Police Academy, spoke on "Subversive Activities" at the chapter's March meeting. This talk supplemented his previous two talks before the chapter during the past several years.

Guest speaker at the April meeting was P. W. Godfrey, missiles engineering division, McDonnell Aircraft Corporation, St. Louis, who discussed "Design and Operation of Liquid Propellant Rockets." He concluded the program by showing two films—"Launching of V-2 at Peenemunde Rocket Test Station" and "High Altitude Research

ing was Brig. General W. Preston Corderman, Deputy Chief Signal Officer of the Army, who addressed the chapter on "Research and Development in the Signal Corps."

The dinner-meeting was held at the Hotel Belleville. During the business session President Harry Cooper and Secretary Allan Eisenmayer reported on the national convention at which they had represented the chapter.

Seattle

An interesting program on "Prospecting for Uranium" was presented at the April meeting by Hershal Wandling of Pacific Electronics Sales Company.

Mr. Wandling discussed various phases of uranium prospecting, pointing out that uranium is not confined to limited areas but is quite widespread. He described the appearance of rock in which uranium is commonly found, and also displayed a number of Gieger Counters and explained their operation.

Mr. W. H. Simpson of International Business Machines was guest speaker on June 6th and discussed data processing machines for scientific and business

CHAPTER NEWS

use. He described the many features incorporated in the latest types of electronic data processing machines. Of particular interest were the various methods of data storage in the machines, such as magnetic tape, magnetic drum and electrostatic storage.

Following the discussion, the group adjourned to the IBM office where a film was shown depicting the principles of operation of the latest types of data processing machines. The chapter members then observed the operation of various types of business machines utilized for punched cards. The demonstration was carried from punching of the cards through various sorting operations and the production of the desired data in printed form. Fred Hall of IBM assisted Mr. Simpson in the demonstration.

South Texas

A challenging and thought-provoking talk on the so-called "brain washing" techniques used by the Chinese Communists in their attempts to break down Korean war prisoners was presented by Captain William E. Mayer, Medical Field Service School, Brooke Army Medical Center, at the April 13th meeting. Captain Mayer was detained until a late hour by the many questions from the members on his talk.

The dinner-meeting was held at the Fourth Army Officers' Club and was presided over by the new president, Howard H. Davenport. By acclamation, the members expressed their appreciation to Col. George L. Richon, past president, and the other outgoing chapter officers for their able leadership during the chapter's first year.

A Western Union program featured the May 10th meeting, with Perry A. Norman of Dallas, Division Manager of Private Wire Services, as guest speaker. Arrangements for the program were made by Morris G. McGee, Superintendent, Western Union, San Antonio, a chapter director.

Mr. Norman, past secretary-treasurer



The "Nike" was featured at the Southern Connecticut Chapter's March 31st meeting. In the photo above are (l to r): Chapter President Edgar L. Love; General William Hesketh, Director of Civil Defense, State of Connecticut; Lester Blasius of the New York Telephone Company, "Nike" speaker; and Edwin P. Hurley, chapter treasurer, who arranged the program.

of the North Texas Chapter, spoke on the subject of new horizons in private wire communications. He discussed the practical application of facsimile operation and presented colored slides showing some of the high speed facsimile equipment in operation. He also described future developments in this means of high speed communications.

The chapter's first year of activity culminated at the national convention in New York when it was named "1954-55 Chapter of the Year" and awarded the "Chapter of the Year" bronze plaque which was accepted by President Davenport. The chapter's performance in the four categories of the annual chapter contest was outstanding, winning three first places and one third place. Credit for this record is due to the enthusiastic leadership of Colonel Richon who organized the chapter and served as its first president.

Southern California

Brig. Gen. Charles B. Westover of the Strategic Air Command was the

principal speaker at the May 4th dinner-meeting. Detailed report had not been received as SIGNAL went to press.

Southern Connecticut

Direct-Distance-Dialing and the "NIKE" Guided Defense Missile were subjects of the double-featured program of the chapter's March 31st meeting. The Southern New England Telephone Company was host in their New Haven auditorium to the seventy-five members and guests in attendance. The speakers were introduced by William Wrenn, Vice President of Southern New England Telephone.

William Robb, general commercial engineer, Southern New England Telephone, reported that by mid-1956 the Hartford area will be included in the "3-D" telephone system, permitting subscribers to dial directly over ten million telephones in the United States. Shortly thereafter, Stamford, Norwalk, New Haven and Waterbury areas will be incorporated in the automatic long-distance telephone arrangement. The speed and simplicity of this improved telephone system were demonstrated by Mr. Robb who dialed directly known numbers in Hartford, Boston, Chicago and San Francisco.

The speaker stated that, nationally, "3-D," incorporating potentially over 52 million telephones, will be organized into number plan areas so that there will be no duplication of telephone numbers, according to the 2-letter, 5-number system, within a plan area. Such an area could have as many as 600 offices of 10,000 phones each with this 2-5 system; however, the practical limit is 300 offices of 10,000 phones each or 3 million telephones. In order to dial an out-of-town phone within an area, the phone number must be prefixed by 112; if the number to be called is outside the plan area, the sequence is 112, three numbers corresponding to the plan area, and then the specific phone number.

Mr. Lester Blasius of the New York Telephone Company gave an enlighten-

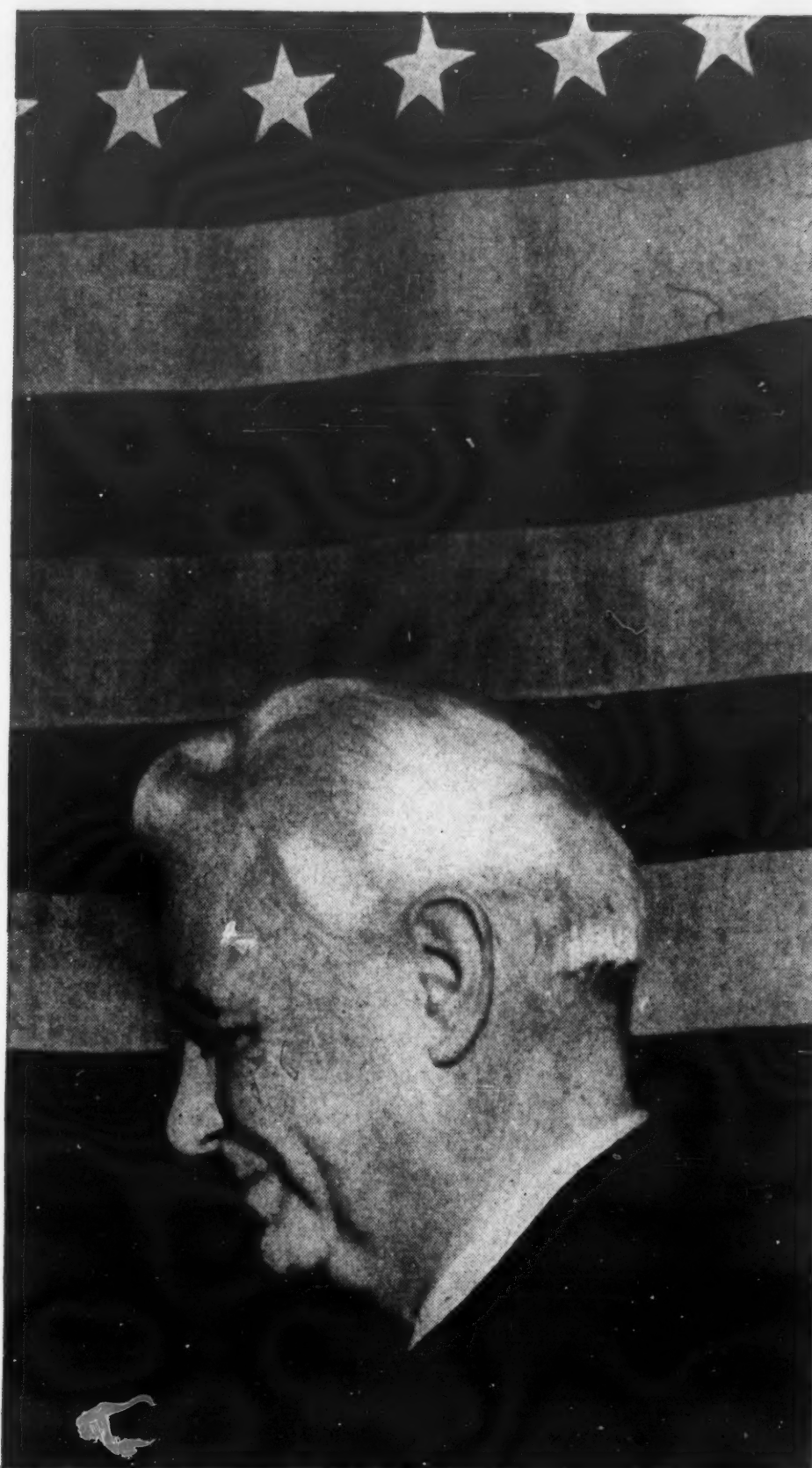


Scene of San Francisco Chapter's May 26th meeting. Following a smorgasbord dinner at the Mart Club, the members adjourned to the KGO Television Studios for a private showing of the show "San Francisco Tonight."

YALTA

**must NOT
happen
again!**

"The fight to prevent the sovereignty and the Constitution of the United States from being undermined by treaties and executive agreements will be carried on in elections, in national organizations, and in Congresses until it is settled to the satisfaction of the overwhelming majority of the American people. The majority would rather live without fear under a government of constitutional restraints than live in jeopardy under a government of men."



Honorable JOHN W. BRICKER
*Speech in the Senate of the United States
August 5, 1954*

The tragedy of Yalta was "government by men" . . . deciding the fate of nations, in secret, without regard for constitutional law or the rights of the peoples involved. We must take steps to assure that in the future the sovereignty and independence of the United States are not undermined by personal government manifested in executive agreements.

W. B. Stewart
President



The **GRAY** Manufacturing Company, Hartford 1, Conn.
Audograph and PhonAudograph "Pushbutton Dictation" Equipment

and Gray Research & Development Co., Inc., Specialists in Video, Audio and Electro-mechanical Devices

CHAPTER NEWS

ing talk on the NIKE, supported strikingly with a scale model demonstration and films. Movies of the progressively devastating effects of the Pearl Harbor, Hiroshima atom and the 1952 Eniwetok hydrogen test bombings were shown. The evolution of rockets from the first in China during 1230 A.D. to the present development of NIKE was also shown and described.

Named after the Greek Goddess of Victory, the NIKE will hit air targets at ranges beyond 35 miles, Mr. Blasius told the group. Sites require about forty acres and many installations are scheduled to be made by early 1956. Mr. Blasius also emphasized the importance of communications and organized civil defense related to NIKE and national defense.

Tinker-Oklahoma City

New officers were elected on March 25th to head the chapter during its second year of activity. They are: president—James F. Nichols, Southwestern Bell Telephone Company; vice presidents—Brig. Gen. Thomas L. Bryan, Jr., (retiring president); Col. Lewis G. Young, 33rd Air Division; Jack W. Grewell, CAA, Will Rogers Field; and Carl A. Atkinson, Communications, OCAMA; secretary—John J. Layden, Western Union Telegraph Company; treasurer—Maj. Chester A. Hazelwood, 1800th AACS Wing.

The Board of Directors are: Frank J. Rohrer, Western Union; Del Cravens, Southwestern Bell Telephone Company; John Mercer, 1800th AACS Wing; Lt. Col. Wayne O. Brewer, 1800th AACS Wing; Lynn G. Dorsett, Dorsett Laboratories; Col. Wesley E. Calkins, 1st AACS I&M Squadron; Richard P. Rembert, Philco Corp.; James M. Kennedy, Western Union; Carl F. Klepzig and Lt. Col. Pete H. Christiansen, OCAMA.

Guest speaker at the dinner-meeting at Tinker Air Force Base was Dr. Waldo Stevens, noted radio and television commentator, who presented his views on the current international situation and civil defense problems.

Tokyo

A luncheon meeting at the Rocker Four Club in Tokyo on April 14th drew a record attendance of 171 members and guests.

Brig. Gen. Arthur J. Pierce, Chief of Staff, Far East Air Forces, was the principal speaker and delivered a timely address on "Communications in the Jet Age."

At the conclusion of the program, members and guests boarded busses for conducted tours of the Bendix depots, General Electric depots, the RCA Industrial Laboratory and Radio Japan's newest TV station.

Newly-elected chapter officers were introduced during the meeting as follows: president—Col. Philip A. Gugliotta, FEALOGFOR; vice presidents—Frank E. Colonna, RCA Service Co., Inc.; Col. Carmon L. Clay, AFFE/8A;



Following the Tokyo Chapter's April 14th meeting, the members toured various industrial installations. Photo above shows the AFCEA group during its visit to Tokyo's newest TV station.

and Capt. John M. Grider, CO NAV-COMMFAC Yokosuka; treasurer—Capt. Thomas C. Musgrave, AFFE/8A; secretary—Charles F. Krause, Philco Corp.

Washington

The chapter's spring meetings featured diversified programs. The April meeting was addressed by Harold Botkin, Assistant Director for Telecommunications, Office of Defense Mobilization, on the subject of "The Mobilization of National Communications in an Atomic Age." Presiding officer of the meeting was Brig. Gen. A. L. Pachynski, Deputy Director of Communications-Electronics, USAF, chapter vice president.

On May 4th, the guest speaker at the luncheon meeting was Rear Admiral H. C. Perkins, Chief of the Office of Operations, U. S. Coast Guard, who discussed "Coast Guard Operations." Program chairman was Rear Adm. Joseph R. Redman, USN (Ret.).

Brig. Gen. T. P. Gerrity, Director of Procurement and Production, Office of the Chief of Staff, Materiel, Hqs., USAF, was the principal speaker at the June 1st luncheon. His subject was

"Air Force Weapons Systems Procurement and the Role of the Electronics Industry." Arrangements for the program had been made by Maj. Gen. Gordon A. Blake, Director of Communications-Electronics, USAF. (See "Quotes in Review," p. 46.)

During the business session, Chapter President Frank W. Wozencraft presented the newly elected chapter officers for 1955-56 as follows: president—John F. Gilbarte, Admiral Corporation; vice presidents—Brig. Gen. A. L. Pachynski, USAF; Capt. Gordon L. Caswell, USN; Brig. Gen. W. P. Corderman, USA; and M. C. Richmond; secretary—George Sheets, Stromberg Carlson Co.; treasurer—Cdr. George Norwood, USNR; general counsel—Ralph L. Walker; member executive committee—Frank W. Wozencraft.

Board of Directors: Capt. Rawson Bennett, USN; Percy G. Black; John N. Boland; Francis Colt deWolf; Francis H. Engel; Rear Adm. F. R. Furth; G. Dean Garner; Capt. G. Van A. Graves, USCG; John F. Hanlon; Thomas B. Jaccoks; Col. W. W. Lindsay, USA; James B. Morrison; L. Hariss Robinson; Harry M. Stephey; and Col. B. M. Wootton, USAF.

Capt. F. C. B. Jordan, Tokyo Chapter president, addresses the April 14th meeting in Tokyo. At left are Preston F. Shivers and Brig. Gen. A. F. Cassevant, chapter vice presidents; at right is Brig. Gen. Arthur J. Pierce, Chief of Staff, FEAF, who was the principal speaker.





Communication center . . . on wheels

The men above will slide that cabinet, on its castors, into a corner and make some electrical connections. Then this office will have its own dial telephone system—hooked up to 40 inside 'phones, with eight lines to outside and two extra service lines for the young lady at the reception desk.

Lots of companies make telephone systems. Trouble is, with many of them, you'd have to find or create a large area somewhere, to house the racks and batteries and other necessary equipment.

Our engineers believe that communication facilities needn't be cumbersome. And one proof that they're right is the file-size cabinet shown above—a complete dial telephone system for offices which have outgrown manual service.

There'll be an operator in the reception room. But all she will do (on a switchboard about the size of a portable typewriter) is answer calls from outside and *dial* them to the parties concerned, plus using her two extra lines for information calls. And she can do clerical work, too.

Everybody else can have full dial service . . . calls direct to co-workers, calls outside by dialing "9," calls after hours without an operator, even paging to locate important personnel anytime.

The situation shown above is a homefront scene. We've been active also in helping solve similar problems for our country's armed forces. Whatever your communication needs, we have over 60 years of experience ready to serve.

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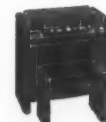
Radios and
High Fidelity
Radio-Phonographs



Sound and
Public Address
Systems



Office
Intercom
Equipment



Electronic Carillons
for Churches and
Public Buildings

ITEMS OF INTEREST

From Government, Industry and the Services

WORLD'S FIRST TRANSOCEANIC TELEPHONE CABLE

Service to be Established in 1956

Laying of the world's first transoceanic telephone cable, spanning the Atlantic between Newfoundland and Scotland, began on June 22.

The project, a joint undertaking of the American Telephone and Telegraph Company, the British Post Office and Canadian Overseas Telecommunication Corporation, will cost about \$40,000,000 by the time of its completion.

The first cable of a *twin* cable system will be spun out across 2,000 miles of ocean bottom by summer's end. Cables will be some 20 miles apart on the ocean floor.

Laying operations will start at Clarenville, Newfoundland, and be completed at Oban, which is on the west coast of Scotland. The second cable is to be laid from Scotland to Newfoundland in the summer of 1956.

A *single* cable will carry the transatlantic circuits 300 miles westward from Clarenville across Newfoundland, through Fortune Bay to the mainland of Canada at Sydney Mines, Nova Scotia. Here a microwave radio relay route will take over for the 575-mile stretch to Portland, Maine, where the system will connect with the Bell System's U. S. telephone network.

Laying of the transatlantic cable has been entrusted to the largest cable ship afloat—HMTS *Monarch*—owned by the British Post Office. This 8,050-ton vessel has a capacity to carry

1,800 nautical miles of deep-sea cable, and can lay six nautical miles of cable per hour.

Telephone scientists have spent many years developing the amplifiers needed to make a deep-sea voice cable operable.

Unique in design, these amplifiers give weakened voice currents new strength as they speed along their 2,000-mile underwater journey.

They were designed to meet three difficult specifications: they had to withstand enormous pressures at the ocean floor—pressures sometimes reaching 3 tons per square inch; they had to be built into the cable and still be slim and flexible enough to pass through the ship's laying gear; and they had to operate for many years without attention.

Each of the cables will contain 52 intermediate amplifiers or repeaters spaced about 40 miles apart. Each employs three vacuum tubes and some 60 other electrical components.

Service will be established late in 1956. Completion of this project will add 36 circuits and greatly increase the reliability of transatlantic telephone service which was opened in 1927 and has been handled entirely by radio-telephone.

Hoover Commission Calls For More Emphasis on Research

According to *Telecommunications Reports*, the Hoover Commission, reporting to Congress the findings of

one of its task forces, has cited the need for more emphasis on research and development by the armed services.

Heading this task force of the Commission, whose report dealt mainly with the Defense Department, is Dr. Mervin J. Kelly, President of the Bell Telephone Laboratories.

Although federal expenditures for research during this fiscal year will total about \$2,400,000,000 and private industry and non-profit institutions will spend another \$2,100,000,000, the Commission still expressed the view that more funds are needed to carry forward the necessary program.

The Commission's report states in part: "The three Services have not distinguished themselves in this field, according to the task force, which observed that since the end of World War II strikingly new approaches have been largely inspired through informal proddings by civilian scientists and technologists. So vitally important an area should not be left to chance."

NATIONAL RESOURCES CONFERENCE

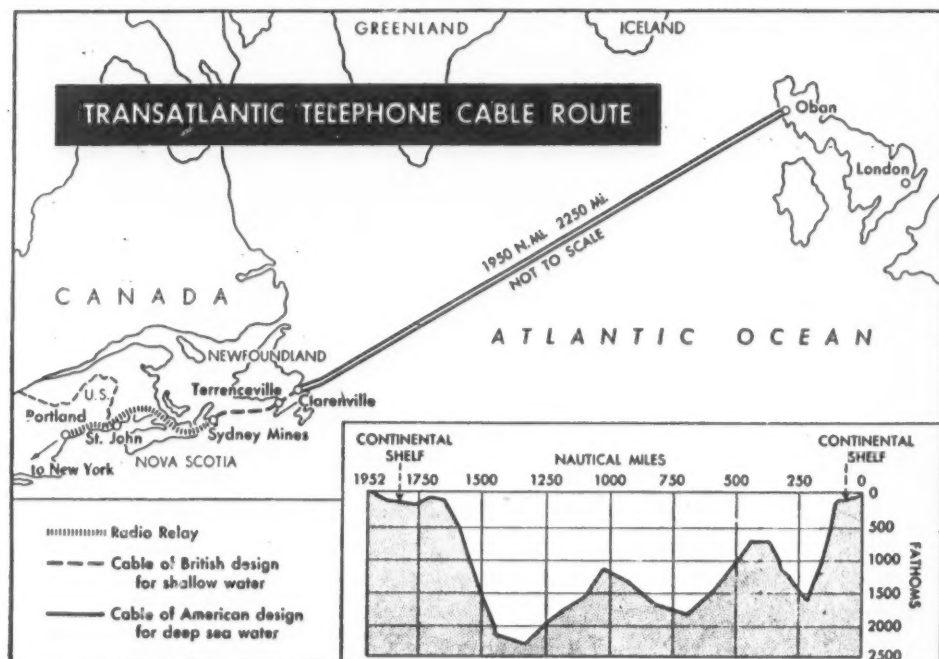
Each year the Industrial College of the Armed Forces conducts a series of National Resources Conferences in major industrial centers of the country.

During the two weeks' conference, thirty-two lectures are delivered by a team of six officers from all the military services.

Among the topics to be discussed are: procurement, war finance, man-

(Continued on page 70)

Below (left) is the overall route of the transatlantic telephone cable system extending from Portland, Maine, to Oban, Scotland. On the right is the HMTS *Monarch*, off Clarenville, Nfld. A launch pulls the first segment of the cable from her hold, using gasoline drums as buoys.



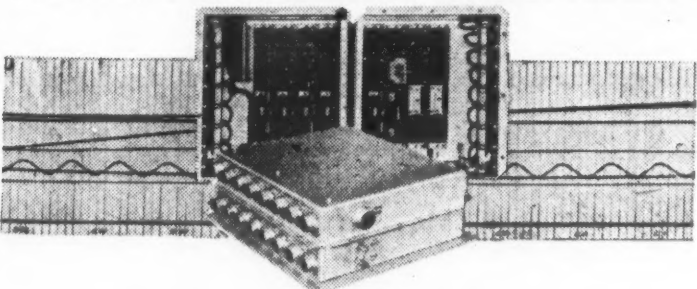
THE PILOT BAILED ... BUT *Bendix-Pacific* TELEMETERING "STAYED WITH THE SHIP"

Up to the last split second of impact, *Bendix-Pacific* telemetering systems continue to furnish information which would never be obtained with other instrumentation methods.

Virtually every condition encountered while an airplane or missile is under flight test — flutter — strain — vibration — temperature — pressure — acceleration — voltages — and motion can be accurately and continuously relayed from lightweight, compact airborne equipment by a crystal controlled r.f. link to an airborne or ground based receiving and recording station.

While a flight is in progress, test results can be observed remotely and flight conditions varied by radio communication. The crew is free to concentrate on flying the airplane ... dangerous conditions can be averted ... or where a crash is unavoidable, the complete story is permanently available for detailed analysis.

A number of airframe companies are speeding up flight testing and cutting costs by using *Bendix-Pacific* telemetering systems. We can aid you, too, in your flight test problems through this method of remote instrumentation.



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ITEMS OF INTEREST

power, strategic and critical materials, internal security, production, technological progress, transportation and communications, emergency management and civil defense.

Civilians desiring to enroll should apply to the civilian selection committee of the civilian sponsoring agency in the city where they desire to attend. In all cities except Miami, the sponsoring agency is the local Chamber of Commerce. In Miami, the conferences are sponsored by the Dade County Board of County Commissioners.

Military officers who wish to attend should apply through normal military channels.

Further information may be obtained from the Industrial College of the Armed Forces, Washington 25, D. C.

EMERGENCY ALERTING SYSTEM

A new conception in emergency alerting has been developed by Federal Electronics of Hollywood, California.

Called "Sigalert," this new system permits civil defense, police, the mili-

tary, industrial plants and ships at sea to receive advance and instantaneous warning in the event of impending disaster.

Invented by Loyd Sigmon, Sigalert was developed at the request of Civil Defense authorities of the City and County of Los Angeles.

This device utilizes the carrier waves of established standard radio stations. Thus, the scope of Sigalert is the entire coverage of the radio stations in the community in which Sigalert has been installed.

Sigalert, controlled at a central point, will activate remote sirens, turn on lights or other warning apparatus and automatically turn on Sigalert receivers.

Designed to operate from regular AC electric current, it can also automatically switch to battery operation in the event of a power failure.

The Sigalert receiver is a specially designed piece of electronic equipment which can be pre-set to four preselected stations. The set will automatically tune to one of the selected stations, thereby providing reliability in case the tuned-in station should go off the air.

The Sigalert master control con-

sole system was specially designed to control the functions of the Sigalert receivers.

The master control contains its own monitoring receiver thereby receiving the signal that it sends out to the various radio stations. All equipment in the master control is of the plug-in type for ease of servicing and installation.

RCA Battery Converts Atomic Radiation to Electricity

A tiny semiconductor device that converts either light or atomic radiation directly to usable electrical energy has been developed by the Radio Corporation of America.

This device, a silicon junction similar to those used in transistors, has been employed in experimental solar and atomic batteries.

Using light and radioactive material interchangeably as sources of radiation, these batteries have powered a specially designed low-power transistorized radio receiver.

The unit in which radiation is converted to electricity is a wafer of silicon into which an impurity is alloyed to form a junction. When the wafer is exposed to bombardment either by beta particles from a radioactive source or by photons of light, electrons are released within the silicon.

These electrons, flowing across the junction, produce a voltage that can be applied to a circuit and cause a current to flow.

Batteries capable of converting radiation directly to electric power will find important applications as sources of electricity for low-power electronic equipment, especially in the field of transistorized devices.

Automatic Underwater Velocimeter

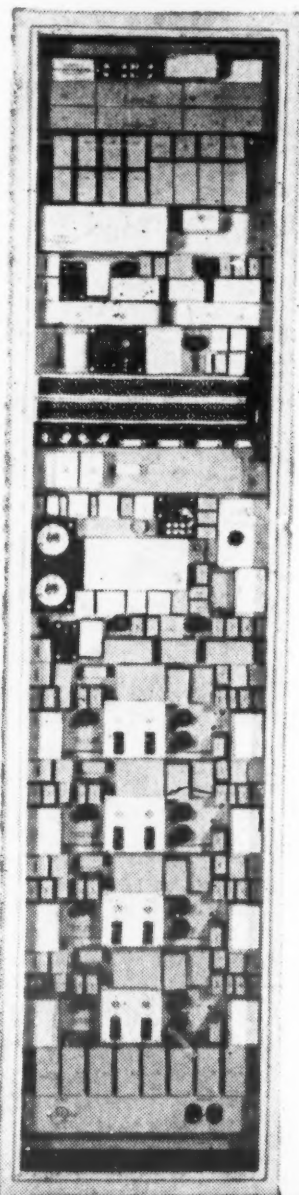
The National Bureau of Standards has recently developed an instrument that automatically measures the speed of sound in the sea to depths as great as 300 feet and plots the result as a function of depth or time.

The instrument was designed and constructed in the Bureau's sound laboratory under the sponsorship of the Office of Naval Research.

This NBS velocimeter consists essentially of a pair of piezoelectric transducers of polarized barium-calcium-lead titanate and a reflector, mounted to form a sound path of fixed length.

A sending transducer is connected to the pulse generator, and the receiving transducer provides the input for a high-gain pulse-shaping amplifier.

(Continued on next page)



FOUR-CHANNEL OPEN-WIRE CARRIER-TELEPHONE SYSTEM.

This is a high-grade long-haul system compatible with three-channel type C, OA-11/FC and OA-12/FC systems. The fourth toll-grade channel has been obtained by advanced filter and oscillator-network design without changing the frequency allocation or degrading the performance of the three carrier channels or of the physical circuit. Transmission in one direction is in the band 3.4 kc to 15.65 kc, and in the other direction in the band 17.95 kc to 31.4 kc. On copper conductors repeater sections average 200 miles, and high-grade circuits several thousand miles in length can be maintained under all climatic conditions.

Type AN/FCC-10 Carrier-Telephone Terminal manufactured for the U.S. Army Signal Corps. This terminal includes regulated-tube rectifiers, d-c telegraph composite sets, line protectors, operator's telephone set, 4-wire terminating sets, v-f signal converter type CV-399/FCC, and all accessories to form a complete packaged 4-channel terminal. It is moisture- and fungus-proofed, and meets all applicable MIL specifications. It is a-c operated.

RADIO ENGINEERING PRODUCTS

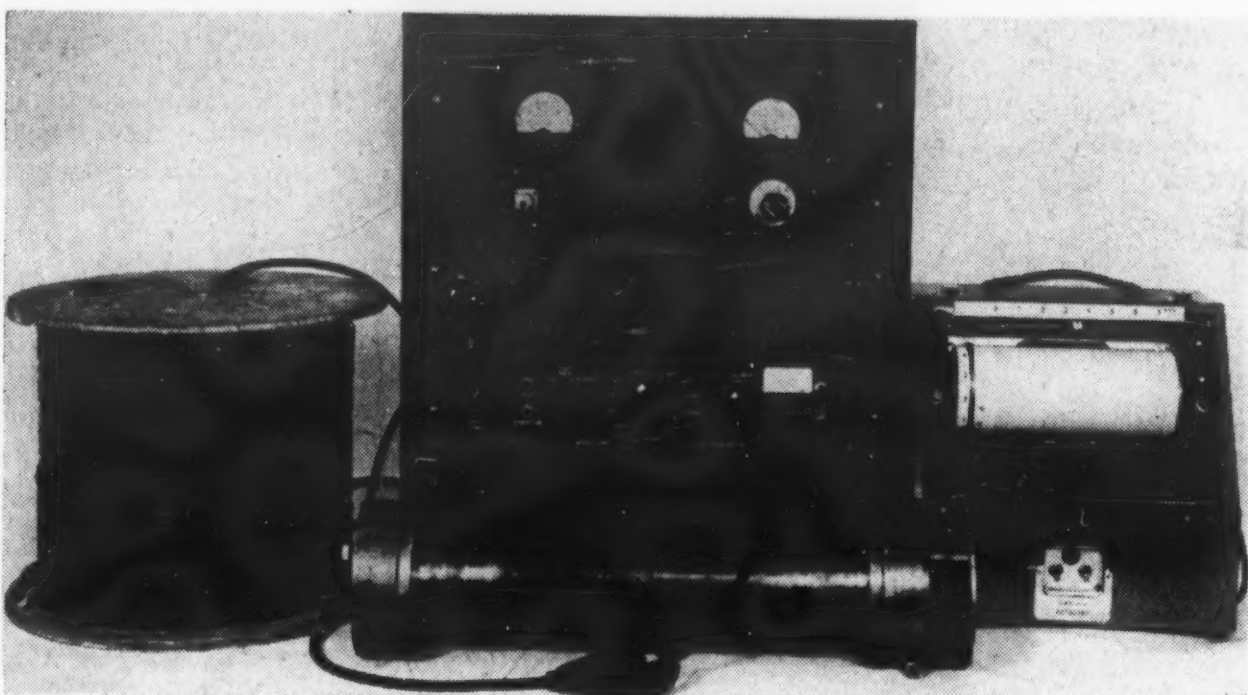
1080 UNIVERSITY STREET, MONTREAL 3, CANADA

Telephone: UNiversity 6-6887

Cable Address: Radenpro, Montreal

MANUFACTURERS OF CARRIER-TELEGRAPH, CARRIER-TELEPHONE AND BROAD-BAND RADIO SYSTEMS

ITEMS OF INTEREST



The Velocimeter developed at the National Bureau of Standards. The brass "fish" (foreground) contains a pair of piezoelectric transducers and a sound reflector. As the fish is lowered into the sea, the recorder (r) automatically plots sound velocity versus depth.

The amplifier output re-triggers the pulse generator, which then applies another pulse to the sender. The sender, in turn, produces in the water a sound pulse to actuate the receiver. Thus the system continually regenerates a sound pulse whose repetition rate, or frequency, depends on the time it takes the pulse to move through the water.

Since the path length is fixed, the frequency depends only on the speed of sound through the water and on the circuit delays. Any variations in sound velocity are recorded as variations in the operating frequency of the velocimeter.

Because of its high accuracy and almost instantaneous response, the velocimeter is expected to be a useful addition to underwater signalling and detecting apparatus. It should also prove to be a valuable research instrument in oceanography.

GE Announces Development of Improved Transistors

New-process transistors recently developed at the General Electric Research Laboratory, Schenectady, New York, can be used in television, radar, shortwave radio, and other electronic devices where high frequency requirements have previously required bulkier vacuum tubes.

These improved transistors are made possible by a new "meltback" process, developed by GE scientist Dr. Robert N. Hall, who is also the developer of the well-known "rate-growing" process for making junction transistors.

"Meltback" significantly improves the control of impurities in the thin layers of germanium or silicon crystals from which transistors are made.

In previous processes, crystals were formed from a pool of molten metal, and the layers created by cycling the rate of growth.

Scientists had the problem of keeping materials in different layers from contaminating each other during the 20 minutes it takes the molten mass to solidify and cool to room temperature.

In Hall's new process, the cooling time is greatly shortened, there is less inter-mixing between layers, and the layers can therefore be thinner.

By using thin, wire-like crystals, and because of the reduced cross-section, the "melting back" is accomplished quickly and cooling takes place in less than a second. In this short time the number of impurities is reduced to about 1/30th the former figure.

"Meltback" transistors have greatly improved gain characteristics. Amplification of current with ordinary transistors usually is approximately 50 times. With the new technique, current gains of several hundred are typical, and results in the thousands have been achieved.

ASTM Organizes Committee On Electronics Materials

A new committee on electronics materials was authorized recently by the directors of the American Society for Testing Materials, Philadelphia, Pennsylvania, to cover the field of materials for electron tubes and semiconductor devices.

This committee, designated F-1 on Materials for Electron Tubes and

(Continued on next page)

The RCA International Division's rapidly expanding engineering activities are providing immediate openings for

RADIO SYSTEMS ENGINEERS

- DUTIES** ■ Systems analysis, design and installation supervision of Radio Communication Systems in foreign countries.
- REQUIREMENTS** ■ Engineering degree and two or more years' experience in any of the following fields:
Telephone and Telegraph Terminal Equipment
Propagation Analysis—HF-VHF—Microwave Bands
- BASE LOCATION** ■ New York Metropolitan area with periodic overseas assignments.
- REMUNERATION** ■ Base pay, travel expenses and overseas bonus.

Please submit resume of experience, education and salary to:

Mr. John R. Weld,
Employment Manager, Dept. M.-A-9C
Radio Corporation of America
30 Rockefeller Plaza
New York 20, New York



RADIO CORPORATION of AMERICA

ITEMS OF INTEREST

Semiconductor Devices, will be concerned with materials for electron tubes such as grid wires, cathodes, mica stampings, glass-to-metal seals and luminescent materials used in cathode ray tubes.

As in other ASTM committees, emphasis will be on research leading to increased knowledge of the materials as a basis for sound specifications and methods of test.

Officers of the committee are: Chairman, S. A. Standing, Raytheon Manufacturing Company; Vice Chairman, F. J. Biondi, Bell Telephone Laboratories; and Secretary, S. Umbreit, RCA Victor Division, Radio Corporation of America.

PACKAGING PROBLEM SOLVED BY CARGO PACKERS

A major maintenance problem in the aircraft and electronics industries—that of packaging rubber “O” rings so that they maintain their precision fit and quality through all kinds of handling, shipment or storage—has been solved by Cargo Packers, Inc., of Brooklyn, New York.

By dielectrically sealing the important color-coated gaskets both



Maj. Bernard Clifford, seated, director of Fort Benning, Georgia, Military Affiliate Radio Station, adjusts a transmitting set at the organizational meeting of The Infantry Center's Electronics Club. L to r: Capt. Donald Worth, Third Army MARS Director; George Parker, ARRL, and Capt. William Scott, acting president. The club program is designed to touch on all phases of electronics.

individually and in strips of five or ten in form-fitting clear acetate or vinyl sheeting, the items can be protected against decay and pressure.

Another advantage of the clear packaging, according to Cargo Packers, is that it permits easy identification of the rings by their color coatings without opening the packaging and exposing the delicate rubber pieces.

Thermatron machines, which are distributed nationally by Cargo Packers, can package more than 2,000 “O” rings an hour.

NEW TUBE AND TRANSISTOR DIVISION AT PHILCO

To keep pace with the rapidly increasing demand for electron tubes and transistors, Philco Corporation

has created a new division to be known as the Lansdale Tube and Transistor Company.

William J. Peltz, formerly vice president in charge of Operations for the Television Division, has been named vice president and general manager of the new division.

Anticipating expansion in the electronics field, this division will manufacture and market a wide range of cathode ray tubes, vacuum tubes, transistors, diodes and other semiconductor devices.

The new division, with its main plant at Lansdale, Pennsylvania, has been a Philco subsidiary since 1947.

“Texas Towers” Under Construction

The first of two 80-foot towers destined for erection 100 miles at sea

(Continued on page 74)

CUSTOM DESIGNED

AND MANUFACTURED
A GUARANTEED PRODUCT

AN... Assumed Responsibility
Engineering Service
Established Reputation

IN
SANDWICH MATERIAL
AND
MOLDED FIBREGLAS
PRODUCTS

Transit Cases

Reusable Containers

Art. Shelters

Passive Reflector Panels

Target Reflector Panels

Airline Cold Food Chest

Mil Specs or Commercial Requirements
BY

The Leader of the Industry

Skydome Inc.
PORT JERVIS, NEW YORK



Radomes

Cases

MOBILE LABORATORY REVEALS AMOUNT OF RADIATION EXPOSURE

Personnel of Fort Huachuca's 16th Signal Battalion have a new use for photography at Camp Desert Rock, Nevada, site of the Army's atomic maneuvers.

A mobile field laboratory for photo-dosimetry, first of its kind to function in the field, is now “reading” and analyzing dosimeter film badges—mandatorily worn by all troops and observers participating in the 1955 nuclear tests.

The badge, a sensitive indicator measuring radiation exposure, tells the wearer to how much radiation he has been exposed.

Encased in transparent plastic, the film badge is worn hooked to an outer garment. Gamma rays register their presence and strength on the dosimeter or dosage indicator.

Measuring about two square inches, these badges contain two types of X-ray film. The less sensitive sheet of film registers relatively

light bombardment, powerless dosages from radioactive rays, ranging from 50 milliroentgens to 20 roentgens.

The other sheet records degrees of exposure from a harmless 8 to a lethal 1,000 roentgens.

Upon return from the field, each individual's badge is rushed to the laboratory's dosimetry section. In a matter of hours all film is developed and the results are submitted to the medics so that treatment can be given to any individual who may have been exposed to harmful doses.

By first treating only the thicker film, rapidity of processing is aided. The high range, thinner film normally does not accumulate any radiation.

Saturation of the thicker film, naturally, indicates the need for processing it. Base fog levels of films to be processed are determined by the addition of control films consisting of two unexposed films bearing the same emulsion number.



RADAR GUNSIGHT HELPS TAC PILOTS BAG "FOE"

Korean-tested Device Proves Deadly Accurate in Stopping Jet "Invaders"

THE STORY BEHIND THE STORY:

Here at home, where air defenses are constantly being strengthened, there's a good chance of detecting and intercepting hostile planes before they reach their destination. And abroad, as you've probably noticed from headlines like the one above, chances are good that aggressors would be intercepted and shot down by fighters from our overseas bases or from NATO wings.

One reason for the impressive marksmanship demonstrated by Tactical Air Command pilots, of course, is their intensive training. Another is the accuracy of the computing gunsight first used in Korea and now serving TAC and NATO squadrons. Here's what it does, in the words of General "Jimmy" Doolittle:

"In jet combat you are chasing a small and elusive speck, and you have only seconds to shoot at it. You are travelling ten miles per minute, twisting and turning; your senses can't measure the speed

and range of the target or the angles involved in hitting it—and even if they could, you lack time for necessary calculations. The new gunsight does this for the pilot. He watches an illuminated circle and dot reflected on his windshield. When circle and dot are superimposed on the target, he fires."

Developed through the joint efforts of the Instrumentation Laboratory of M.I.T. under Director Dr. C. Stark Draper, Sperry, and U.S.A.F.'s Armament Laboratory—the radar gunsight is an example of teamwork at its best—providing better weapons for defense efficiently and economically.

SPERRY *GYROSCOPE COMPANY*

DIVISION OF THE SPERRY CORPORATION • GREAT NECK, N.Y.

ITEMS OF INTEREST

has been shipped to the east coast by Blaw-Knox Company of Pittsburgh, Pennsylvania.

Installation of these towers will be one of the first links in a network of weather-defense stations to be established off the Atlantic Coast.

The two towers will be erected on unusual platforms called "Texas Towers," which take their name from off-shore oil drilling rigs, built by Bethlehem Steel Company, Quincy, Massachusetts.

The huge platform upon which the towers will be erected is supported by vertical steel tubes which are driven into the sea floor by air jacks. The upper deck rides some 87 feet above the water.

Built for the U. S. Navy to serve as an off-shore radar warning and weather data collecting station, it will provide quarters for 70 Air Force, Navy, Coast Guard and weather personnel.

Personnel

ANKENBRANDT TO SUCCEED CORPUT AS JCEC DIRECTOR

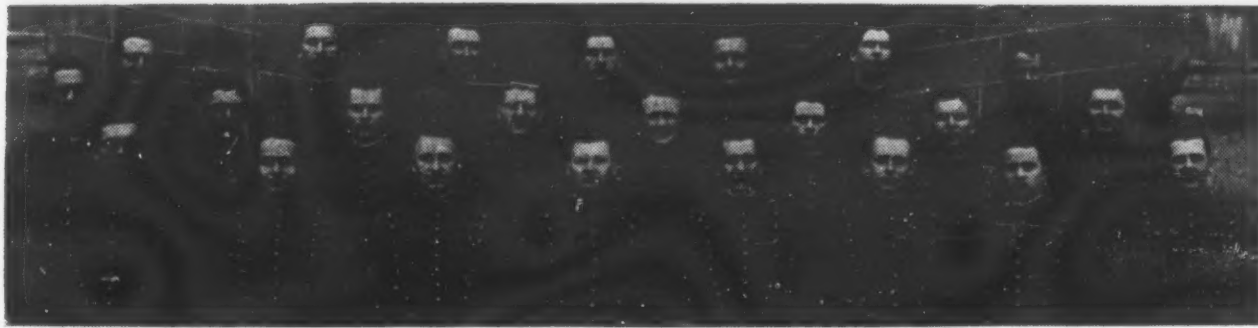
Major General Rex V. D. Corput, USA, Director of Communications-Electronics, Office of the Joint Chiefs of Staff, who will retire from the Army on July 31, will be succeeded by Major General Francis L. Ankenbrandt, USAF.

Succeeding General Ankenbrandt

Corput



Ankenbrandt



Pictured above are members of the Class of 1955, United States Military Academy, who were commissioned Second Lieutenants, Signal Corps, Regular Army of the United States. First Row, l-r: Harry M. York; Charles H. Stevens; Richard B. Struss; Robert E. Deardorff, Jr.; Paul Fetko; William L. McCulla, Jr.; Paul R. Smor; Thomas J. Brooks. Second Row, l-r: Thomas A. Price; Francis E. O'Brien; Charles H. Symonds; Norman W. Sparks; Raymond L. Shideler; Frank D. Troyan; William M. Wix; Frank E. Ceglowski. Back Row, l-r: Walter E. Campbell; Gerald Lewis; John V. Rock; Edward A. Mendell; John E. Dryer; Philip H. Enslow, Jr.; Royal C. Bosshard.

in his present post as Commander of the Airways and Air Communications Service is Major General Dudley Hale, USAF, now Assistant Chief of Staff, Operations, Allied Forces in Central Europe.

General Corput's retirement brings to a close a 35-year military career. After early service in the field artillery, he began his Signal Corps career as an instructor at the Signal Corps School at Fort Monmouth.

Among his many assignments he served as Signal Officer of the Eighth Army in the Pacific; Chief of the Signal Plans & Operations Division, OCSigO; and Chief Signal Officer of the U.S. Army in Europe. He returned to this country to assume his present post in July 1953.

General Ankenbrandt, who becomes Director of Communications-Electronics, Office of the Joint Chiefs of Staff on August 1, has served with the Signal Corps for 20 years.

After top assignments in the Pacific area during World War II, he became Air Communication Officer at Air Force Headquarters in Washington.

In 1948 he was named Director of Air Force Communications. From that post he went to Europe where he served as Chief Signal Officer at SHAPE, returning to the U.S. in 1954 to his present post at AACS.

Honorary Degree For Redman

Rear Admiral John R. Redman, USN, Commandant of the Twelfth Naval District, was recently awarded an honorary degree of Doctor of Laws by the University of Nevada in Reno, Nevada.

Admiral Redman is a native of Reno, and his present command includes his home state of Nevada, Utah, and northern California.

He has spent much of his Naval career in the field of communications, having served as Director of Naval Communications, 1949 to 1951, and Director of Communications-Electronics of the Joint Chiefs of Staff from 1951 until 1953.

AT&T Names Oliver to New Post



Benjamin H. Oliver, Jr., general plant manager of the New York Telephone Company's Long Island area, has recently been transferred to the American Telephone and Telegraph Company

as assistant vice president in charge of plant operations.

He has been an active member of the Armed Forces Communications and Electronics Association for many years, having recently served as chairman of the 9th Annual AFCEA Convention. He is now vice president of AFCEA's New York Chapter.

General Uhrhane New R & D Chief

Brigadier General Francis F. Uhrhane is now on duty as the new Chief of the Research and Development Division, OCSigO.

General Uhrhane, who has served in the Army for the past 25 years, fills the post left vacant by Brigadier General W. Preston Corderman, who recently became Deputy Chief Signal Officer (p. 113, May-June SIGNAL).

WIRE LINE CARRIER SYSTEMS ENGINEER

wanted for high-level position with managerial responsibilities in established electronics manufacturing company.

Should have 5 years' experience in wire line carrier telephone work, with at least 2 years spent in applications, either with manufacturer or large carrier operator. Experience in carrier operation in Armed Forces is applicable. Bachelor's degree or professional engineer status required.

Some travel, about 10% of time, will be necessary.

The right man for this job will find no quibbling about salary.

Stromberg-Carlson Company has been pioneering in telephone industry for 60 years, and is known for high quality of products. One of fastest growing companies in the industry, offering excellent opportunities for advancement. Liberal bonus, other benefits.

Located in Rochester, New York, in heart of beautiful Finger Lakes Country. Community noted for fine schools, cultural, recreational facilities.

Also have openings for several carrier and microwave sales engineers. Must be free to travel in limited territory. Successful sales experience required. There may be an opening in your area.

If you qualify for either of above positions send resume of experience to General Manager, Telephone Division, Stromberg-Carlson Company, Rochester 3, N. Y.

PERSONNEL CLEARING HOUSE

AFCEA Members Available to Industry

The pages of **SIGNAL** are open to active AFCEA members who are seeking positions in the communications, electronics and photographic industries. Any member is entitled to space free of charge in this column for three issues of the magazine. Please limit your notice to five lines. In replying, employers are asked to address: Box _____, **SIGNAL**, 1624 Eye Street, N. W., Washington 6, D. C. Letters will be forwarded to the AFCEA member.

FORMER SIGNAL CORPS & CIC OFFICER. Age 35. Army, Air Force and civilian training and experience in personnel, labor relations, training, safety and security. College degrees supplemented by advanced training in foreign languages. Desires opportunity in export department, safety-security or personnel-industrial relations. Box 110.

SIGNAL CORPS PHOTOGRAPHIC OFFICER. Two years' experience as chief of Army type "A" lab in support of research and development. Former newspaper photographer. Technical knowledge plus strong journalistic background. Still specialist, some motion picture, audio-visuals. BS degree. Seeks technical, publications, or sales position. Box 111.

COMMUNICATIONS EXECUTIVE (Engineering). 30 years' experience in commercial and military fixed plant systems both American and European. Senior Signal Corps officer. Widely varied background. Available in May, 1955. Box 112.

EIGHT YEARS' EXPERIENCE in transportation and communications. Background in public utilities financing, taxation, and personnel management. Education includes law degree. Box 113.

PURCHASING AGENT, EXPEDITING, SUB-CONTRACT ADMINISTRATION. Electronics and associated fields, raw materials and components. 31 years old, 6½ years experience. Seek opportunity with foremost organization in communications field. Compensation secondary to real opportunity. Highly referenced. Box 114.

Government and Military Positions Available

Government and military agencies are invited to use this column to announce available positions which may be of interest to the readers of **SIGNAL**. Notices will be published three times if not cancelled before. Applicants apply as indicated in individual notices.

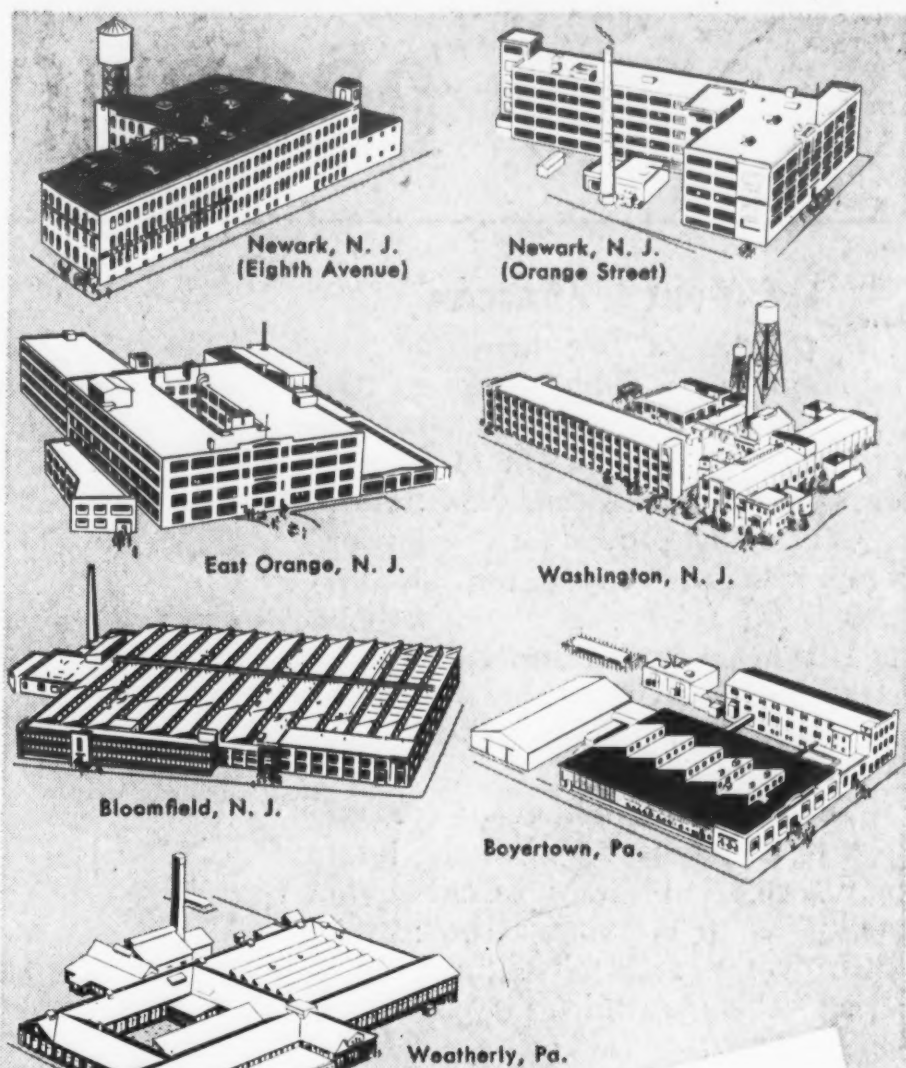
APPLICATIONS ARE REQUESTED for electronic, aeronautical, mechanical, industrial engineering, editorial and photography positions located in the U. S. Naval Air Missile Test Center, Point Mugu, Port Hueneme, California. Applications, and requests for the complete Vacancy List of 39 available positions with salaries ranging from GS-5 to GS-13, should be addressed to: Mr. R. A. Riebow, Employment Superintendent, U. S. Naval Air Missile Test Center, Point Mugu, Port Hueneme, California.

THE SPECIAL DEVICES CENTER, Office of Naval Research, located 25 miles from New York City at Port Washington, Long Island, needs electronic and aeronautical engineers. Applicants must possess degrees in engineering, and pertinent electronic or aeronautical engineering experience. Apply to Mr. David A. Lana, Industrial Relations Dept., Special Devices Center, Office of Naval Research, Port Washington, N. Y.

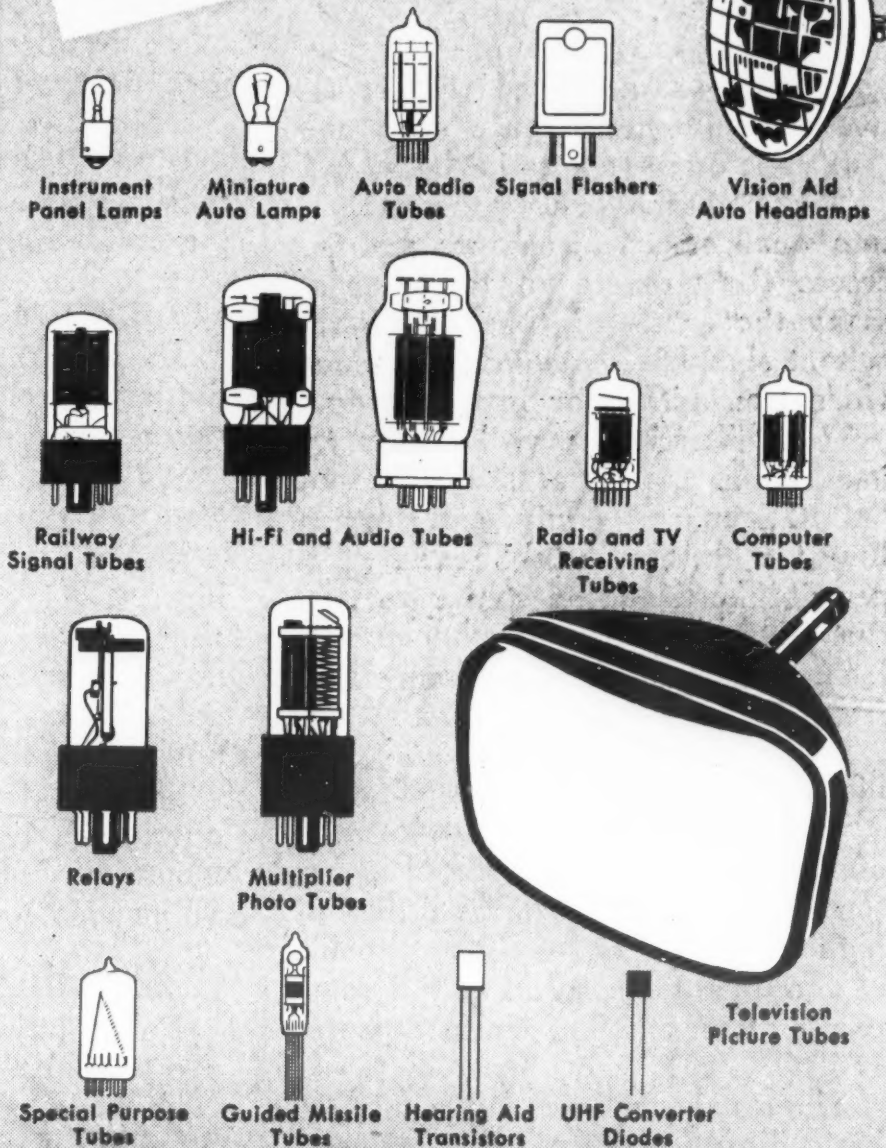
A CONSIDERABLE NUMBER OF CIVILIAN positions are now being created at the Presidio of San Francisco to replace certain military now occupying administrative positions. These openings include Civil Service Commission rated electrical engineer, civil engineer, mechanical engineer, and architectural engineer. Applicants should apply directly to the Civilian Personnel Division, Building 36, Presidio of San Francisco, California.

RADIO OPERATOR TECHNICIANS. Veterans \$3400-\$4200 to start. Overseas opportunities. Amateur or commercial licenses helpful. Full pay during advance training. Good advancement opportunities. Submit resume with name, age, address, phone number—if any, military experience, private training, work experience, FCC licenses—if any. Armed Forces Communications and Electronics Association will forward same immediately to employer who will acknowledge your application direct.

TELETYPE OPERATORS AND CRYPTOGRAPHIC TECHNICIANS. Veterans \$3200-\$3700 to start. Overseas opportunities. Full pay during training period. Good advancement opportunities. Submit resume with name, age, address, phone number—if any, military experience, FCC licenses—if any. Armed Forces Communications and Electronics Association will forward same immediately to employer who will acknowledge your application direct.



This is Tung-Sol



TUNG-SOL ELECTRIC INC., Newark 4, N. J.

Sales Offices: • Atlanta • Chicago • Columbus • Culver City (Los Angeles) • Dallas • Denver • Detroit • Montreal (Canada) • Newark • Philadelphia • Seattle

NEW PRODUCTS from Industry

Du Mont "Vitascan"

A pick-up of live television pictures in color, without using television cameras, was demonstrated recently by Allen B. Du Mont Laboratories, Inc., Clifton, New Jersey.

Called the Du Mont "Vitascan" Color Studio Scanner, the new system is the reverse of a conventional television studio pick-up system. Instead of receiving light through a lens, the scanner emits light from a cathode-ray tube.

This beam of light scans the subject to be televised and the light that is reflected is picked up by means of multiplier phototubes. These tubes convert the reflected light into an electrical signal which may be passed on to a standard color television transmitter for broadcast.

A "studio scanner," which has a lens like an optical camera, directs light beams from the scanner over the studio scene. Clusters of highly sensitive "multiplier phototubes" catch and amplify red, blue and green parts of the light rays reflected from the scene.

Arranged in groups of four, the phototubes are equipped with sensitive color filters to make each one "see" one of the colors in the view.

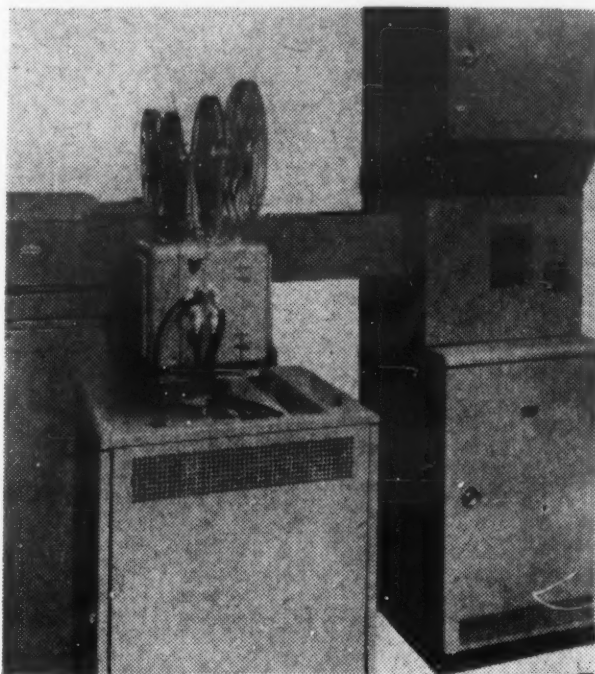
The phototubes convert these colors into small electrical charges and increase the strength of the charges many thousands of times. The resultant signal is sent on to the color video transmitter for broadcasting.

The "Vitascan" may be used by itself or as a part of the Du Mont "Multi-Scanner" equipment. When linked with the "Multi-Scanner" it permits the television station to telecast pictures in color or monochrome from live sources, from 16mm films, from slides, or from opaques.

High Power Silicon Rectifier

Transitron Electronic Corporation of Melrose, Massachusetts, has recently announced the availability of high power silicon rectifiers capable of continuous operation at full rated power at an ambient temperature of 125° C.

These new rectifiers overcome the basic disadvantage of selenium, germanium, and gas filled tubes, and provide for the first time, reliable operation under wide variations in ambient temperature.



Complete Du Mont "Multi-Scanner" which produces color or black and white television pictures in the form of live TV pickup or from 16mm film, slides or glossy photos.

Their high forward conductance and low leakage current allow operation at extremely high efficiencies. In most applications, efficiencies of 90% to 99% are easily achieved.

These Transitron rectifiers do not exhibit aging effects, common to other rectifiers, and therefore offer much longer life under severe operating conditions.

Hermetically sealed construction provides permanent protection against the environment.

Miniature Magnetic Clutch

The Instrument Division of the Sterling Precision Instrument Corporation, Flushing, New York, has recently announced the development of a miniature magnetic clutch.

Excellent torque characteristics and high speed engagement and disengagement times make it an ideal component for precise applications in guided missiles, high accuracy computers and miniature servo systems.

Single-ended concentric input and output shafts are located at the mounting end of the unit, permitting all gearing to be located at this end.

Standing Wave Detector

Polytechnic Research & Development Company, Inc., of Brooklyn, New York, has designed the PRD 219 Standing Wave Detector to supersede expensive and bulky slotted sections in the range of 100 to 1000 mc/s.

This device is a low cost solution for making impedance measurements

easily and accurately in this region.

By connecting the output to a VSWR indicator, such as the PRD Type 277, VSWR may be read directly on the indicator meter. No special detection equipment is required.

The reflection coefficient angle is easily determined merely by rotating the top drum dial to a minimum indication on the meter and reading the angle on the dial directly in electrical degrees. The probe and crystal detector are self-contained.

Capacitance-Resistance Analyzer

Cornell-Dubilier of South Plainfield, New Jersey, has recently announced a new Model BF-70 Capacitance-Resistance Analyzer for service shop and industrial testing purposes.

This 10 lb. portable instrument quickly and accurately measures the important characteristics of essentially all types of capacitors and resistors.

Its features include a direct reading calibration scale which provides simplified measurements, avoiding possible errors in using multipliers or charts.

Sensitive capacitance measurements between wires and shieldings, transformer windings, cable wire and other similar conditions are also possible.

The built-in panel meter is arranged for independent external voltage measurements to 750 volts and current measurements to 75 milliamperes.

Sprague Transistorized Clamped Flip-Flop

A new plug-in transistorized clamped flip-flop with unusually low power and space requirements is now being produced by the Sprague Electric Company of North Adams, Massachusetts.

Designed to meet a need for a sub-miniature plug-in binary element for computer applications, the new encapsulated Type 200C5 flip-flop uses an entirely new concept of printed circuit design.

Power and space requirements of the 200C5 are about one-third less than conventionally wired tube flip-flop circuits. These reductions are

(Continued on next page)

NEW PRODUCTS

very real considerations in modern computer systems, and are often the limiting factors in computer design.

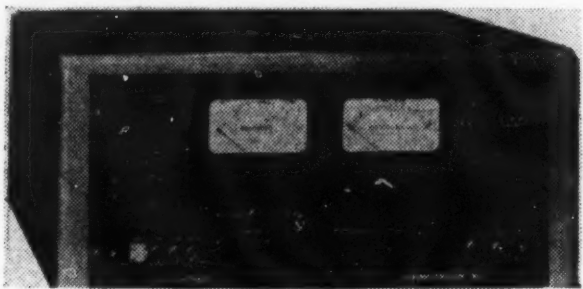
Entirely transistorized, the circuit includes two junction transistors, two input diodes, and four clamping diodes.

Encapsulated in a plastic jacket for humidity resistance, the entire unit measures $1\frac{5}{8}$ inches by $1\frac{5}{16}$ inches and has a standard 7-pin miniature tube-type plug-in base.

New Device Measures Production Line Noise

Production line and developmental test noise figure measurements have been made possible through the design of the Auto-Node, a product of the Kay Electric Company of Pine Brook, New Jersey.

The Auto-Node will allow automatic noise figure measurement from 5 to 26,500 megacycles, with continuous interpolation over the VHF, UHF and microwave frequencies.



Kay Electric Auto-Node

Said to be extremely accurate, the Auto-Node features direct reading noise figure to facilitate the speed with which measurements can be made. Two models are available: Auto-Node model TV and model Radar.

Vacuum Tube Voltmeter

A new vacuum tube voltmeter for extended-range voltage, resistance, and current measurement, has been developed by Technology Instrument Corp. of Acton, Massachusetts.

Known as Type 800-A, it combines the inherent accuracy of the basic voltmeter with a highly degenerative amplifier circuit.

Combined with the further improvement of developing the feedback voltage across a single precision resistor, the degenerative network provides previously unachieved stability.

The uniform circuitry of the 800-A provides this long-term stability by the elimination of the tube-aging problem and the effect of fluctuations of the meter's copper-wound coil resistance due to temperature and manufacturing variations.

(Continued on page 78)

AMONG IMPORTANT
ACTIVITIES AT HUGHES
IS A PROGRAM INVOLVING
COMPREHENSIVE
TESTING AND EVALUATION
IN CONNECTION WITH
HUGHES-DEVELOPED
RADAR FIRE CONTROL
AND NAVIGATION SYSTEMS
FOR LATEST TYPE
MILITARY ALL-WEATHER
INTERCEPTORS.



Convair F-102
all-weather interceptor.

System Test Engineers

There is need on our Staff for qualified engineers who thoroughly understand this field of operation, and who have sufficient analytical and theoretical ability to define needed tests; outline test specifications; assess data derived from such tests, and present an evaluation of performance in report form.

Engineers who qualify in this area should have 1 a basic interest in the system concept and over-all operation of test procedures; 2 experience in operation, maintenance, "debugging," development, and evaluation testing of electronic systems, and knowledge of laboratory and flight test procedures and equipment; 3 understanding of basic circuit applications at all frequencies; 4 initiative to secure supporting information from obscure sources.

SCIENTIFIC AND ENGINEERING STAFF

Hughes

RESEARCH AND
DEVELOPMENT LABORATORIES
Culver City, Los Angeles County, California

NEW PRODUCTS

Because of the highly stable circuitry of the Type 800-A independent AC and DC zero-set controls need be set only on voltage ranges below 1 volt full scale. Once adjusted for low scale operation, no further calibration is required for measurement in any multiplier range.

Microwave Absorbers

Two new series of microwave absorbers have been recently placed on the market by Emerson & Cuming, Inc., of Canton, Massachusetts.

One series, designated Eccosorb CH, is of flexible, rubberized fiber for use in microwave darkrooms. With a maximum energy reflection of 2% at all angles of incidence, this absorber permits antenna measurements to be made indoors.

Its material is light weight, easy to apply and its surface is white for best lighting conditions.

The second series, designated Eccosorb HF, is for use as waveguide terminations and loads. It is produced in standard rods and sheets or molded to specified shapes.

Each member of the Eccosorb HF series is of a different bulk resistivity; the entire range covers from 50 to 10^{12} Ohmcm³.

Winston Linearity Generator

A white dot linearity generator, called the "Win-Tronix," is now being manufactured by Winston Electronics, Inc., Philadelphia, Pa.

The instrument, Model 160, is compatible for black-and-white or color television, and provides both large and small white dots for ease of color receiver convergence, plus vertical and horizontal bars for sweep circuit alignment.

Internally generated vertical synchronized pulses and locked to-line frequency give stable operation. The device has radio frequency carrier output and external modulation provisions.

Reeves Analog Computer

Dynamics Corporation of America has recently announced the development of a new analog computer, the REAC "400," by its subsidiary, Reeves Instrument Corporation of New York, N. Y.

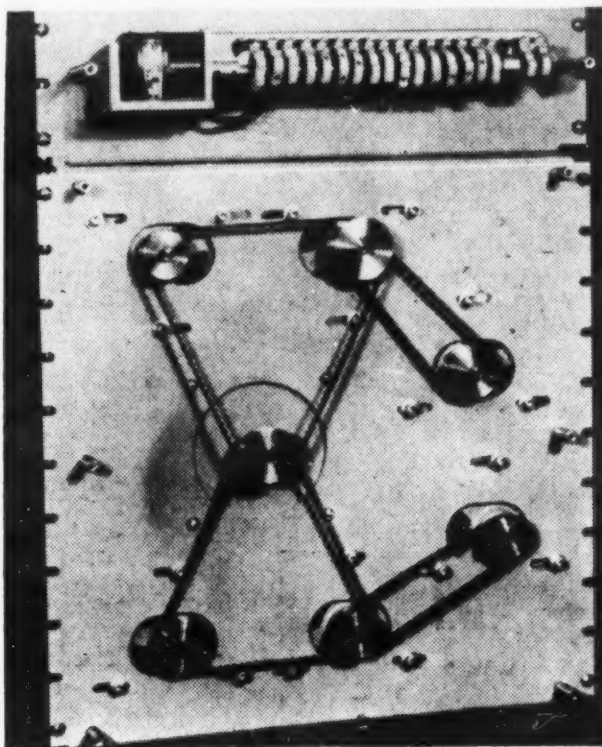
Development of the new electronic analog computer in a "building block" design will make automation available to a wider variety of governmental and industrial users at reduced costs.

The new "400" REAC (Reeves

Electronic Analog Computer) requires only half the space needed by previous models and costs for automatic units from individual installations have been materially reduced.

This reduction has been made possible because each computer installation can now be custom-built for the job at hand with mass-produced units.

Newly designed elements of the "400" include computing amplifiers having wider band width with greater power output and improved efficiency, servo multipliers and servo resolvers with greatly improved dynamic performance, and other auxiliary equipment such as electronic multipliers and function generators.



Holtzer-Cabot 25-Watt Multi-Frequency Ringing Panel.

Holtzer-Cabot Multi-Frequency Ringing Panel

Holtzer-Cabot Telephone Equipment Division of National Pneumatic Company, Inc., Boston, Massachusetts, has announced the introduction of a new 25-Watt Multi-Frequency Ringing Panel.

This ringing machine, the first of its kind in the telephone industry, is capable of generating harmonic, synchrotonic or decimonic series of ringing frequencies, all at the same low cost.

It has a rated output of 25 watts for each of the five basic frequencies. Voltage selection is regulated at the output terminal strips. No insulating transformers are required.

The low AC power consumption of the primary unit assures continuously low operating costs. The stand-by unit uses a minimum of DC power, thereby extending the battery's life during power failure.

All generators are the permanent

magnet type, and cannot be demagnetized by short circuits or disassembly. They are cog-belt driven from either a synchronous AC motor or a governor-controlled DC motor to ensure exceptionally accurate frequency regulation.

TV Picture Tubes From CBS-Hytron

CBS-Hytron, a division of Columbia Broadcasting System, Inc., has announced two new television picture tubes with a 90-degree deflection angle which provides a shorter overall tube length and thus cuts cabinet size.

The Danvers, Massachusetts firm states that the two types, 17AVP4 and 17ATP4, differ mainly in that the first measures 15 $\frac{5}{8}$ inches overall, and the second 16 $\frac{1}{4}$ inches.

Both are of all-glass, rectangular construction, with gray-glass spherical face plates that provide great contrast under high ambient light conditions.

Each employs an electron gun designed for use with a single-field external ion-trap magnet, and both have an outer conductive coating that, when grounded, serves as a high-voltage filter capacitor.

Tape Resistor Kit

A tape resistor kit, designed for laboratory use in experimental or development work involving the use of tape resistors, has been announced by Hansen Electronics Company of Los Angeles, California.

The entire kit is packaged in a compartmented case of heavy gauge polystyrene plastic measuring 7 $\frac{1}{8}$ " by 1 $\frac{3}{4}$ " high.

Known as the Type RNP 1C Kit, it eliminates the delay necessitated each time it is desired to try one or a few resistors in a circuit since a wide range of sizes are immediately available from the kit.

Bristol Pyrometer Recorder

The Bristol Company of Waterbury, Connecticut, announces that its Dynamaster Thermocouple Pyrometers can now be equipped with a linearizing cam which converts a non-linear thermocouple millivolt signal into a straight-line form for recording and control.

This device converts a non-uniform analog into linear form suitable for feeding into a digital readout device. It should prove particularly valuable in processing problems requiring computer or servo system control.

(Continued on page 80)



These men go out of their way to find bad reception

IT MIGHT SEEM ODD, but *some* men actually hunt for bad reception areas.

One day you might find them in hard-to-reach fringe sections—miles and miles from a TV station. The next day they will be in an area that has reported a unique type of interference. And they keep going until they have subjected their television receivers to every known type of interference.

On the side of the truck in which they travel, you'll see the inscription, "Zenith Radio Corporation." This rigorous testing in the field leads to methods of improving Zenith products.

It is just another way that Zenith assures its customers, both civilian and government, that they will be the first to receive engineering advancements in radionic products. And it is just another

step in the continuous research that Zenith has conducted during 36 years of specialization in radionics.

Among the many developments that have come from Zenith laboratories are such important television "firsts" as the Blaxide® tube, one-knob tuning, fringe lock circuit, spot-lite dial and gated beam sound stabilizer.

Another Zenith development designed to make television watching even more enjoyable is Phonevision®, which would make it possible for millions of viewers, by paying a small fee, to see outstanding events not now available on TV. After 25 years of laboratory and field work, Phonevision is ready now to open a whole new world of marvelous, untapped entertainment for 34,000,000 television set owners.

Such far-sighted research and experimentation brings you richer, more enjoyable hours of leisure at home. And it also adds to the security of your home and of your neighbors' homes, for Zenith's progressive engineering and precision manufacturing are called upon frequently by the government to turn out always-dependable, ever-better weapons of defense.

For full details on Phonevision, write to the address below for a free booklet.

ZENITH



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ZENITH, backed by 36 years of specialization in radionics, serves America with a **STRONGER DEFENSE AND A BETTER WAY OF LIVING**

NEW PRODUCTS

Conversion is achieved through the use of a cam and linkage in the slide-wire housing in the Dynamaster Potentiometer. This cam positions the slidewire contact, depending on the millivolt response curve of the thermocouple involved.

With this mechanism, the rotation of the contractor shaft is linear with thermocouple temperature. The record and indication is also linear, and a uniformly graduated chart is used.

High-Frequency Vibrator For Testing Electron Tubes

Gulton Mfg. Corp. of Metuchen, New Jersey, has announced the availability of the Glennite piezoelectric high-frequency vibrator for vibrational resonance testing of electron tubes and calibration of the accelerometers.

The vibrator, Model AT-10A, has been specifically developed to generate high frequency mechanical vibration in small structures or devices.

It has a fundamental resonant frequency of 27 kc and is resonant-free up to that point. It utilizes a rigid stack of Glennite piezoelectric ceramic

transducers in a balanced inertia design where the center of the vibrating structure does not move.

The stiff electromechanical design minimizes the effect of loading masses, handling masses up to 3 ozs. Sensitivity is 2.3 micro-inches per 55 volts input and acceleration range up to $\frac{1}{2}$ g at 1 kc and 50 g at 10 kc.

Low-Cost TV Color Converter

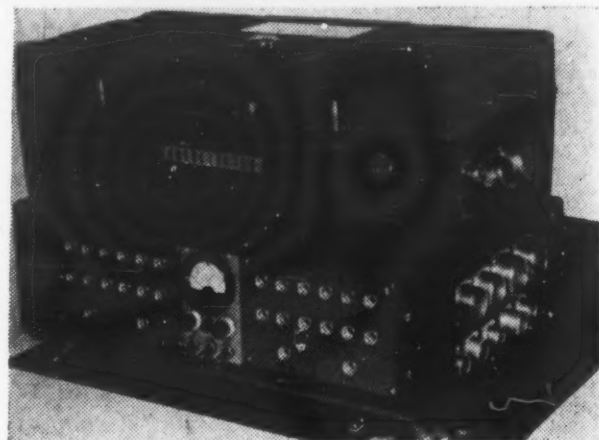
A color converter, marketed under the trade name of COL-R-TEL, brings color television more nearly within reach of the average consumer.

This converter, manufactured by Color Converter, Inc., Columbia City, Indiana, can be used on any size black and white television receiver.

Through an electronic process, the black and white compatible picture is resized and converted to a 14-inch color picture when color programs are being transmitted.

One of its two parts is a small electronic instrument which is permanently affixed to the back of the set, out of sight, and wired into it. The other part is the color filter in a 15-pound housing which rests on rubber cushions on top of the black and white set.

The manufacturer claims that COL-R-TEL in no way affects the life or performance of the black and white set.



Pictured above is the Datatape recorder (top) and amplifier (bottom) of the Datatape recording system. As shown above, the amplifier is attached to a shock-mount.

Portable Magnetic Tape Recording System

A highly accurate, portable magnetic tape recording system for airborne collection of test data has been developed by Consolidated Engineering Corporation of Pasadena, California.

Called "Datatape," the system will perform under extremely adverse environmental conditions and permit simultaneous recording of great quantities of data during a single flight.

The system, packaged in individual, compact, modular units, includes a recorder, amplifier and modulators, a calibrator, a time-code generator, and remote-control power supply.

Design engineers report the recorder unit will store 28 tracks of information on $1\frac{1}{4}$ -inch tape, providing 24 data channels and 4 auxiliary channels, including a microphone input. It has a tape capacity of 43 minutes of recording at a speed of 10 inches per second, when using tape of conventional thickness.

Play time can be extended to 70 minutes or longer using thinner tapes and reducing tape speed to $7\frac{1}{2}$ inches per second or less.

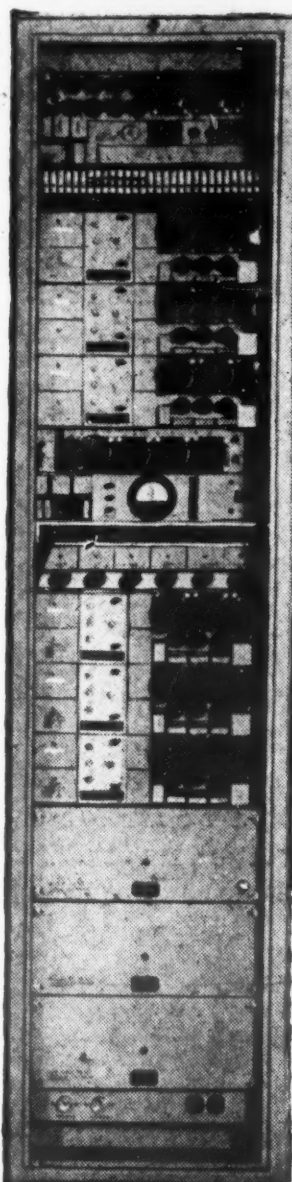
A single track data-monitor head readily detects such mechanical failures as broken tape, improper tracking, failure of uniform tape motion, or end of the tape. Electronic failure is also readily detected.

Prodelin Cover-Loop Antenna

For more efficient UHF-TV broadcasting, Prodelin, Inc. of Kearny, New Jersey, has developed a new cover-loop antenna.

Prodelin's new antenna is a low power ultra high frequency television transmitting antenna for low power television broadcast and satellite sta-

(Continued on page 82)



TYPE F2 CARRIER-TELEGRAPH SYSTEM

Provides up to 40 teletype circuits on a telephone channel.

This compact, economical, high-grade, long-haul, main-line voice-frequency carrier-telegraph system is available in two channel spacings. The type F2A system, employing 120-cycle spacing between channels, provides up to 40 channels in the band of 300 to 4980 cycles. The type F2B system, employing 170-cycle spacing, provides up to 28 channels in the band of 255 to 4835 cycles. Up to 15 channels with oscillators, relay test and metering facilities, jacks and bay terminals will mount on a single 8-ft. bay. A channel-terminal panel containing send and receive circuits for one channel requires only $5\frac{1}{4}$ " and four channel oscillators only $1\frac{3}{4}$ " of space on a 19" rack. A highly-developed level-compensation circuit provides practically undistorted signal reception over a wide variation of line net loss. Standard loop options are half- and full-duplex, battery normal and reversed.

New and exclusive techniques in the design and manufacture of filters and oscillator networks provide a higher degree of frequency stability than has previously been possible, with resultant reduction in signal distortion. This equipment is in current production, and early deliveries can be made of complete systems or of single panels.

Typical 6-channel packaged terminal of type F2 equipment. This is the type AN/FCC-12 (Channels 1-6) or AN/FCC-13 (Channels 7-12) Telegraph Terminal, as manufactured for the U.S. Army Signal Corps. It is complete with regulated-tube rectifiers for plate and bias supply, and positive and negative telegraph loop-current supplies, jack field, relay test panel, monitor circuits, fuses, spares, etc. The equipment is moisture- and fungus-proofed, and meets military standards where applicable. Up to four cabinets may be used together, to provide a completely self-contained 24-channel terminal.

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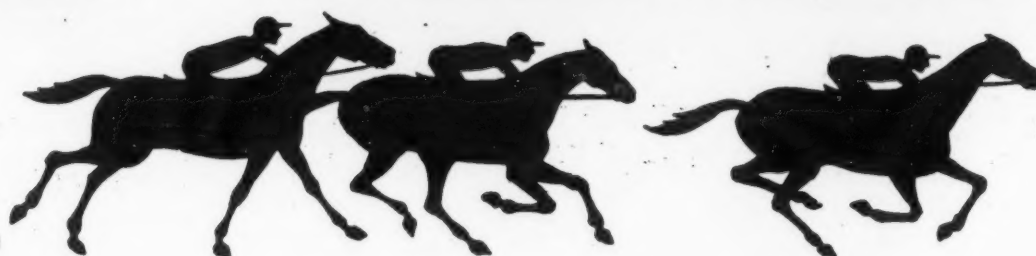


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years
ago**

with this first laboratory test transmission*



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* This first laboratory test was in January, 1935. Five weeks later on February 14th, news pictures transmitted from San Francisco appeared in The New York Times.



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NEW PRODUCTS

tion use and provides a means of radiating aural and visual signals with definite gains and pre-determined horizontal and vertical radiation patterns.

Electrically, the antenna is an extremely broad band antenna having a band width much wider than any other UHF television antenna. Signal energy is supplied each loop via semi-rigid coax cable comprising an individual feed line system which in turn is fed from a single transmission line input.

Because all radiating loops are fed in parallel, they are always in phase at all frequencies and the beam direction is fixed and independent of frequency. The radiated pattern is thus much more stable with variations of temperature and humidity.

Miniature Power Transformers

Hycor Company, Inc., North Hollywood, California, has recently announced a new line of miniature power transformers for 400 cycles and higher frequencies.

These units are available with output power ratings up to 15 volt amperes with multiple windings from 1 volt to 500 volts.

The transformers come in miniature metal cases or in plastic encapsulated form to satisfy MIL-T-27 requirements.

Toroidal construction minimizes external fields and results in extremely high efficiency.

Vibration Controls Described In Catalog From Finn

A complete line of mounting bases, vibration and shock controls is described in a new catalog from the Electronics Division of T. R. Finn & Company Inc., Hawthorne, New Jersey.

The catalog contains detailed descriptions of standard and special mounting bases, and a wide selection of vibration and shock controls, all of which meet JAN and MIL specifications.

Of particular interest is Finn's all-metal vibration mount. Designed for airborne operation under all operational hazards, its resonant frequency is reported to be below 10 cps and its magnification factor less than $1\frac{1}{2}$ at resonance with no double resonant peaks.

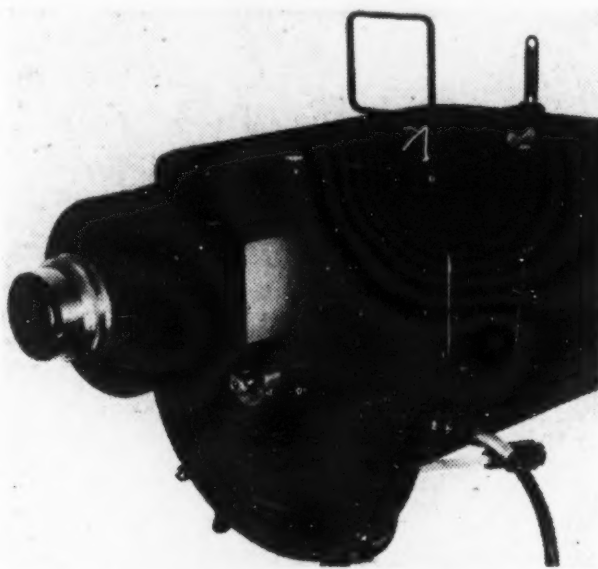
Copies of the catalog are available by writing to the company's Electronics Division.

Photography Hulcher Rapid Sequence Camera

A new press type rapid sequence camera utilizing 70mm film and producing negatives $2\frac{1}{4}$ " by $2\frac{1}{2}$ ", has been announced by the Charles A. Hulcher Company, Inc., of Hampton, Virginia.

Designated the Hulcher Press 70, the camera provides 5 to 20 pictures per second at exposure rates of $1/25$ to $1/2800$ second.

Speed of the camera, accurately controlled by means of a centrifugal governor, may be changed simply by turning a calibrated knob on the side of the camera.



Shown above is the Hulcher rapid sequence camera. It utilizes 70mm perforated film available on standard 100-foot spools, each loading of which provides 470 pictures.

The camera is equipped with a highly efficient variable opening rotary disc shutter operating close to the focal plane.

Full size reflex focusing on a finely ground screen provides for precise and rapid focusing. A folding view finder enables the photographer to accurately track fast moving action.

The Press 70 is powered by a small high torque electric motor, operated by means of a small, portable 12 volt battery. It may also be operated from a standard 115 volt A.C. line by means of a 12 volt transformer.

Film Produces Image Directly From Negative

A new film that bypasses photographic processing steps to produce a positive image directly from a negative has been announced by Ozalid, a Division of General Aniline & Film Corporation of Johnson City, New York.

Called Ozalid Reversal Foil, the new product can be exposed and developed in seconds in an Ozalid Machine. Like all translucencies, it can then be used to reproduce any number of Ozalid copies.

Reversal Foil will give positive reproductions of transparentized photo-stats and blueprints, as well as film negatives. Line, halftone, or continuous-tone originals can be copied quickly with this product, a .005" clear cellulose acetate.

Printers and photographers will find Reversal Foil an excellent intermediate for proofs. In the visual aids field, it can be used to prepare film transparencies for overhead projectors.

High-Speed Film For Polaroid Land Camera

High-speed sixty-second film, called Polaroid Pola Pan, which permits one-minute picture taking by ordinary room lights, is now available from the Polaroid Corp. of Cambridge, Massachusetts.

The film will be rated in two speeds, 400 and 200.

Although the film will first be made available for the larger size Polaroid cameras, the "Speedliner" model 95A and the "Pathfinder," it is expected that it will soon be available in the smaller size for the "Highlander" model.

As compared with the standard Type 41 film, this new film has a wider tonal range, assuring details in shadows without blocking highlights.

16mm Continuous Projector For Color Television

A new 16mm projector designed to improve the quality of color television film programs by providing a continuous, uniformly-illuminated image, has been announced by the Eastman Kodak Company.

Designated the Eastman Kodak Projector, Model 300, its special features include an f/1.6 optical system and automatic compensation for film shrinkage.

The optical system on the projector has a collimating lens of 25" focal length, tilting, rotating mirrors to compensate for film travel, and a 3" f/1.6 objective lens focused on the film.

The projector operates at the standard speed of 24 frames per second. The mechanism is driven by an 1800-rpm synchronous motor which is loosely coupled to a small synchronous motor in the sound head to keep the two motors in phase during starting and stopping.

It is equipped with arms to accommodate 3,000-foot reels, and is contained in a cast aluminum housing on top of an electronic scanner.

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TAPE WOUND CORE IMPROVEMENT

in 6 years



revolutionary ALUMINUM CORE BOX[†] construction

withstands HIGH TEMPERATURE • VACUUM IMPREGNATION
HEAVY WINDING STRESSES • SHOCK and VIBRATION

This is a development which calls for immediate changes in purchasing specifications for Tape Wound Cores, because introduction of the Aluminum Core Box means designing your toroids around four important new advantages:

1. Use of an aluminum core box means the new Magnetics, Inc. tape wound cores will withstand temperatures of *at least* 450° F.
2. Because of the unusual seal provided by forming the aluminum over the silicone glass seal, true vacuum impregnation of your coils is now possible. Varnish cannot penetrate the core box and affect magnetic properties of the tape.
3. The strong aluminum construction absolutely prevents deflection of the core box when coils are wound—a distortion-free construction which means no change of magnetic properties.
4. Cushioned with an inert material, the tape winding in the core box is protected against vibration and shock. In most cases it is so completely minimized that it is no longer a problem.

Because of the many advantages of these new Magnetics, Inc. Tape Wound Cores, it will pay you many times over to specify "Aluminum Core Boxes" on your next order.

[†]PATENT PENDING

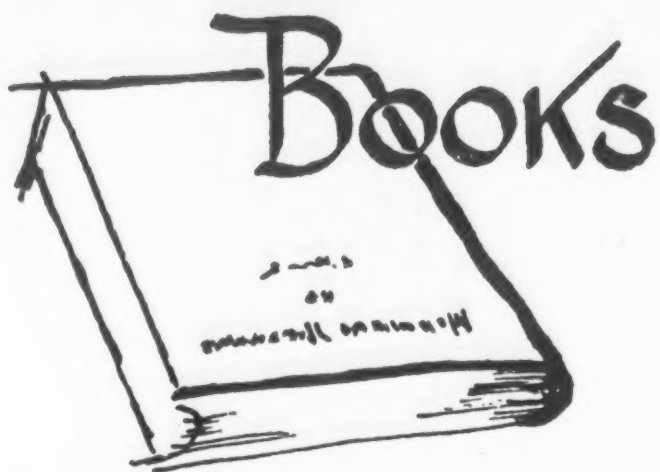
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SERVOMECHANISM AND REGULATING SYSTEM DESIGN, Volume II. Harold Chestnut and Robert W. Mayer, John Shipley and Sons, New York, N. Y. 368 pages, \$8.50.

Volume II of this study is distinguished by several important features. It states the problems met in design regulators and feedback control systems and develops methods for their solutions.

Although an analytical approach is employed, the emphasis has been placed on practical design.

The book provides an early chapter on the measurement of quantities and treats thoroughly the means of establishing design specification. It develops techniques for handling the effects of extraneous signal inputs. Factors influencing the selection of power elements and stabilizing sections are adequately covered.

A description of all a.c. servomechanism design is given, as well as many illustrated problems adopted from actual design projects.

AMERICAN MILITARY POLICY. C. Joseph Bernardo and Eugene H. Bacon, Military Service Publishing Co., Harrisburg, Pa. 493 pages, \$5.00.

Doctors Bernardo and Bacon supply a fully documented and accurate account of how top level policy has been developed through the years and how it has worked out in practice.

Here the reader will discover the origins of American military policy and follow it through successive wars to the atomic era and the "new look." Many examples are given to show how mistakes in high military policy have always been with us—and how we never seem to learn.

Our Book Department can furnish any book currently in print. We will also help to secure older copies that you may need to complete your library. A 10% discount allowed all Association members on orders of \$10 or more. Please indicate author and publisher where known and allow three weeks for delivery.

Most of the time, George Washington had to tailor his strategy and even his tactics, not to the military situation, but to the manpower and supply situation imposed on him by military policy. The authors show that some of these short-sighted, ill-considered policies have been repeated in all our emergencies, and to some extent are still with us.

It is interesting to note that today's military leadership must still bend its planning to fit what it knows will be the realities of the political situation as regards procurement of troops and equipment, rather than what the military needs dictate.

THE ARMY AIR FORCES IN WORLD WAR II, Volume VI, Men and Planes. Edited by W. F. Craven and J. L. Cate, University of Chicago, Chicago, Ill. 700 pages, \$8.50.

Men and Planes deals with the activities of the Army air arm in the Zone of the Interior. It was within the Zone of the Interior that activity during the war was directed toward implementing the basic formula laid down by General Arnold when he described an air force as "a balanced compound of three essential elements—airplanes, combat and maintenance crews, and air bases."

The first five volumes of *The Army Air Forces in World War II* have completed the story of the combat activities of the Army Air Forces in the several theaters. This sixth volume of the series makes possible a thorough understanding of the groundwork which underwrote these combat operations.

A studied appraisal of the efficiency and effectiveness of a vital aspect of Army Air Force in action in World War II, *Men and Planes* adds to the established record of the significance of air power in a global war.

MACHINE TRANSLATION OF LANGUAGES. Edited by William N. Locke and A. Donald Booth, John Wiley and Sons, New York, N. Y. 226 pages, \$6.00.

This collection of fourteen thought-provoking essays provides an account of what has been achieved to date in the application of machines to translations. Engineers and students of linguistics will find a good survey of present gains and a guide post to future development.

Beginning with an historical introduction, the book goes on to cover such topics as the automatic dictionary, problems of the "word," the operational analysis of the Russian language, speech input, idioms and syntax.

In the book's foreword, Dr. War-

ren Weaver says, "Translation from one language to another presents important, old, and difficult problems. These problems, however, are being overcome. Students of languages, the logicians who design computers, the electronic engineers who build and run them—are now engaged in erecting a new Tower of Anti-Babel."

THE RADAR POCKET BOOK. R.S.H. Boulding, Van Nostrand and Co. New York, N. Y. 165 pages, \$3.50.

This book provides, in concise form, information on the basic electrical principles and formulae applicable to radar, together with data on various parts of a radar installation.

Illustrated profusely, it includes many typical circuit diagrams of the different units of modern radar equipment, with their operation clearly explained. As a pocket book, it represents all the essential data in a compressed form, and includes developments such as the use of crystal rectifiers and transistors.

The chapter on testing and test gear will be found particularly useful. Engineers and operators concerned with the construction, installation and use of radar equipment, whether they require a concise textbook or a day-to-day reference, will find this work an aid.

THE QUARTERMASTER CORPS: ORGANIZATION, SUPPLY, AND SERVICES, Volume II. Erna Risch and Chester L. Kieffer, Superintendent of Documents, 404 pages, \$4.00.

The story, continued from Volume I, of the important part played by the Quartermaster Corps in supply planning for World War II, is completed in this volume. An analysis of its contributions in cutting supply demands through conservation, reclamation, and salvage operations is thoroughly discussed.

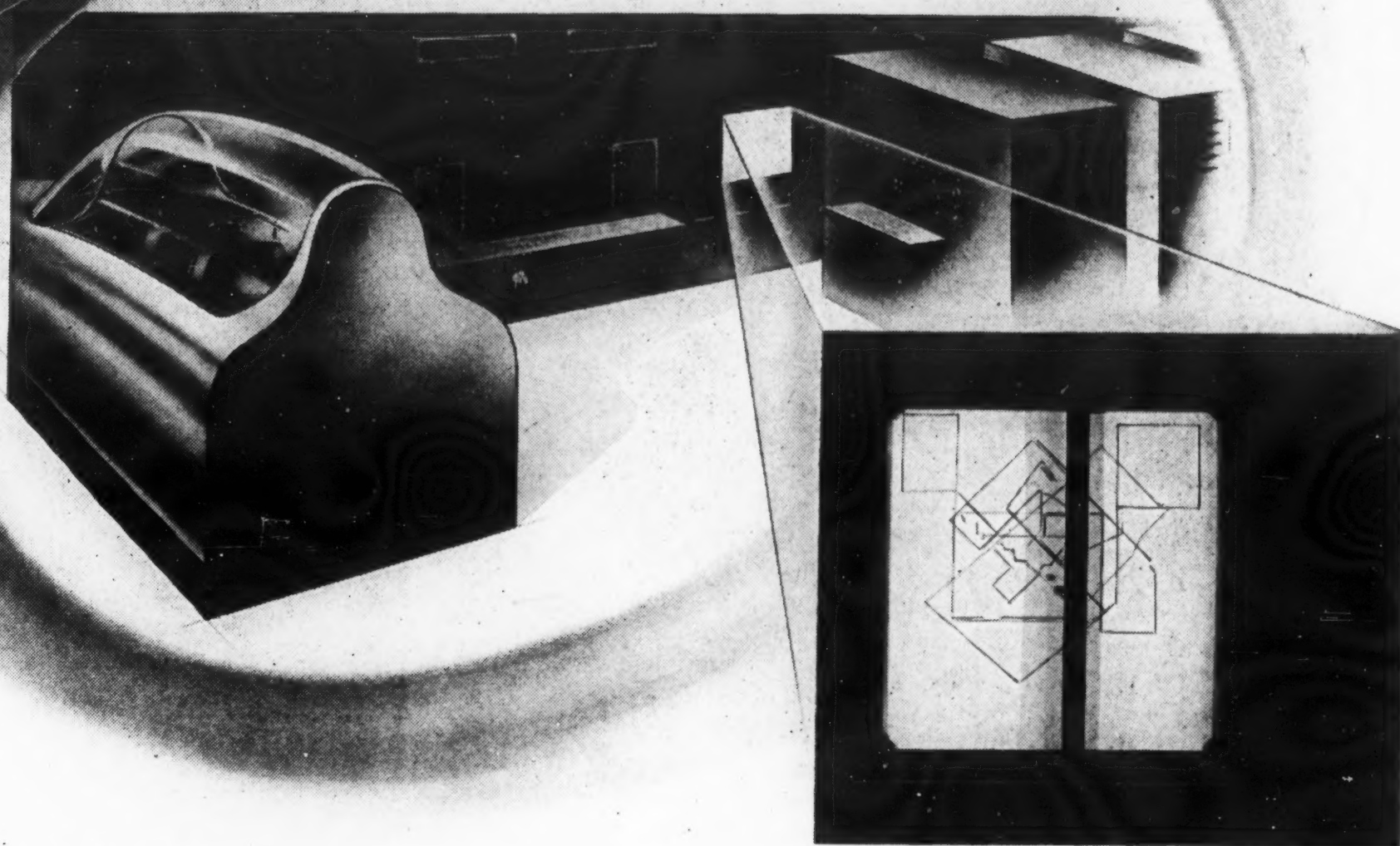
Based on Quartermaster records, the book includes the failures as well as the successes of the Corps. While the authors have explained the lack of preparation and planning for the tasks imposed by World War II, they also completely depict the vigor and ingenuity with which the Corps attacked them.

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THE plotting board designed by Melpar Inc.—scoreboard of the new U.S. Air Force supersonic simulator for F-100A planes—is another example of Atlas manufacturing ingenuity at work.

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Bring your electro-mechanical designs to us. Our design, production and methods engineers,

tool makers and skilled mechanics are ready to work on your project on a job basis . . . as many men, machines and hours of work it requires and no more. Every modern tool and cost cutting technique is at your service to save you time and labor on a complete electro-mechanical assembly or a special part for electronic equipment. Write today for your copy of "Precisioneering Electro-Mechanical Equipment." **ATLAS PRECISION PRODUCTS CO.**, Philadelphia 24, Pa. (Div. Prudential Industries).

"From Drawing Board . . . to Production Line"



ATLAS

Precision Products



ASSOCIATION AFFAIRS

(Continued from page 50)

Industrial Division Manager; J. Bilis, Field Engineer; L. R. Breese, Chief Design Engineer; C. A. Conry; W. W. Crissinger, Chief Field Engineer; C. Curran, Field Engineer; C. W. Freeman, Chief Engineer of the Telephone Division; G. C. Harmon, Government Section Manager; R. H. Stone, Field Engineer; R. B. Wiseman, Telephone Division Mgr.

NEW AFCEA STAFF MEMBER

Edward R. Nida, of Washington, D. C., has been named executive assistant to George P. Dixon, Executive Vice President of AFCEA. In addition to his duties as Colonel Dixon's assistant, Mr. Nida will be advertising manager of SIGNAL, replacing Frank Martins whose increased duties as Association accountant make the change necessary.

A recent graduate of the University of Maryland, Mr. Nida worked successively in the advertising departments of the *Washington Evening Star* and the *Washington Times-Herald*.

On the editorial side, Mr. Nida also worked on the *Baltimore Evening Sun* and two Maryland weeklies, the *Independent* of Hvattsville and the *Prince Georges Post*.

Educational Television

(Continued from page 29)

study for other forms of education are obvious. Consider these eight facts:

1. There are 3.5 million illiterates in this nation that prides itself on its high level of public education.
2. About ten million people over 25 years old—some 11% of their age group—are functional illiterates, that is, they have completed less than 5 years of school.
3. Nearly one-half of the adult population has never attended high school.

From Textiles to Electronics

(Continued from page 43)

tries. Its citizens extend a sincere invitation to all industrialists in search of the best industrial atmosphere and accommodations to investigate this offer.

One thing is proved beyond doubt. Everything in and of the community lends itself to the successful operation of the electronics industry. A surplus of skilled labor is eager and capable to adjust to the demands of this

4. Only 6% of American adults have completed a college education.
5. One out of every six draftees is rejected by the armed services for lack of educational fitness.
6. Less than half of our children have access to nursery or kindergarten schools.
7. Between 1950 and 1960, elementary and high school enrollments are expected to increase by approximately 50%.
8. Last year at least 700,000 public school students were forced to attend classes only half time because of a lack of school rooms.

In 1950, America graduated an all-time high of 50,000 engineers. Last year, the total had dropped to only 19,000. *Experts say that this is a direct result of high school students not taking courses preparatory for college, science and engineering.* Part of this difficulty is the result of poor instruction in science and mathematics: the number of science teachers in high schools has declined 50% since World War II.

Television can help to solve these difficulties and can do so economically and effectively. It is not too much to expect that a great "university of the living room" will develop. This means the use of human resources, the most precious we have, in a way that brings strength to the individual and to the nation.

USAF Communications—

Electronics . . .

Strategic Air Command

(Continued from page 37)

In bombing, in navigation, in air traffic control, in fire control systems, electronics is the tool which makes operations possible. The bomber must find the target, hit it, and get home safely. Radar techniques permit ready target identification in spite of weather, camouflage, smoke smog, etc. Radar also facilitates accurate navigation to and from the target and guides the aircraft to a safe letdown on return.

On many of SAC's missions, air refueling is used, and here again electronic equipment plays its part in guiding the bombers to the tankers in any kind of weather. Electronic computers help the navigator to fix his air position at all times and are especially useful in poor weather when the aircraft is flying over water, where radar is of little value.

Radar protects the bomber by detecting enemy fighters and directing defensive fire. At high altitude and high speed, normal vision is so poor that radar is usually the only sure means of detecting aircraft in the vicinity. Electronics also plays a part in crew training, as a means of evaluating bombing accuracy.

Strategic Air Command is in daily contact with engineering and research activities, civilian and military, in a ceaseless effort to improve the performance of existing electronic equipment and to develop better devices. The demand for improvements is unceasing, and systems are constantly changing to meet the needs of new weapons. SAC constantly acquires more know-how from all available sources.

Much R&D Required

Many problems still remain unsolved. In some, a way seems clear for eventual solution. For example, we cannot call a specific aircraft without bothering all the hundreds of others in the air; however, a solution to this problem appears imminent. But in other areas, much further research and development is required. We need even more rapid communications techniques, with greater security and increased capacity. Much has already been achieved and more will be done.

Many industrial techniques which may be adapted to military use are being explored, and many have already been adopted. For instance, we are now emulating the police and taxi-cab companies in an attempt to provide radio control for maintenance and other vehicles used on the flight line.

Our major problem for which no

(Continued on next page)

promising and expanding field. These workers are comfortably housed and enjoy all the facilities of modern living. Industrial space now exists to accommodate a large part of this industry. Full cooperation will be gladly given in all phases to assist in the construction of new industrial space, if such is desired and necessary.

And what is most important the "welcome mat" is at the Greater Lawrence threshold. The community invites you to become a member of the family.

USAF/C-E . . . SAC

(Continued from preceding page)

immediate solution seems imminent is that of retaining our skilled and trained maintenance and operator personnel in the communications-electronics career field. Certain incentives have been offered, but it is too early to tell how effective these will be.

SAC now has the communications means to control present forces, as well as electronic aids to make that force an effective one. To maintain and improve this capability is now the aim. Communications-electronics will continue to play its part in maintaining the inherent flexibility of the force, in making its punch more and more effective, and in increasing the potential of new weapons in the defense of the United States.

USAF Communications— Electronics . . .

Tactical Air Command

(Continued from page 39)

over to the Forward Air Controller, the Forward Air Controller takes over the direction of the aircraft. He has been in the front lines during the battle and is familiar with the ground situation and knows what and where the target is. By means of air-to-ground radio communication, he directs the pilot to the target. Thus, by means of voice radio communication the pilot is able to find and hit the target. Normally these Forward Air Controllers are vehicle-mounted in a tank or a truck and have available point-to-point radio as well as air-to-ground radio. Sometimes they too take to the air and control air strikes from low flying aircraft. In either case the success of the strike is dependent on reliable electronics communications.

Dependence on C&E

In addition to electronic devices and systems used in the control and guidance of tactical aircraft in the performance of their missions, Tactical Air Command units are interconnected by intricate electronic communications systems. It is inconceivable that any military force comprised of more than a handful of people and covering more than an acre of ground can operate without electronic communications. There are the usual administrative circuits from headquarters to all subordinate echelons. There are the operation circuits, including scramble circuits,

to all air fields. There are the usual weather and flight following circuits, and in addition, the Tactical Air Control System has telling and reporting circuits inter-connecting various radar sites and the control center. The majority of this circuitry is microwave or radio relay with HF radio backup.

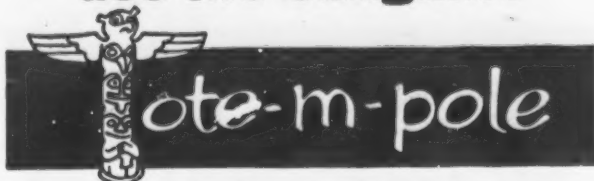
Thus we see how by proper exploitation of the little electron, we are able to provide communications and electronics systems which enable Tactical Air Forces to fulfill their complex three-fold mission, and without which the United States Air Force, with all its aircraft and nuclear weapons, would fail for the want of this modern "horseshoe nail."

Attention!

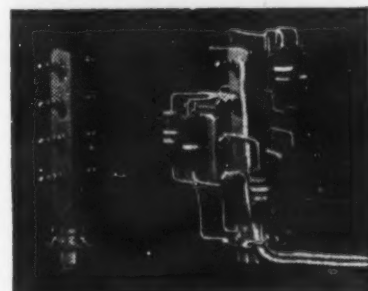
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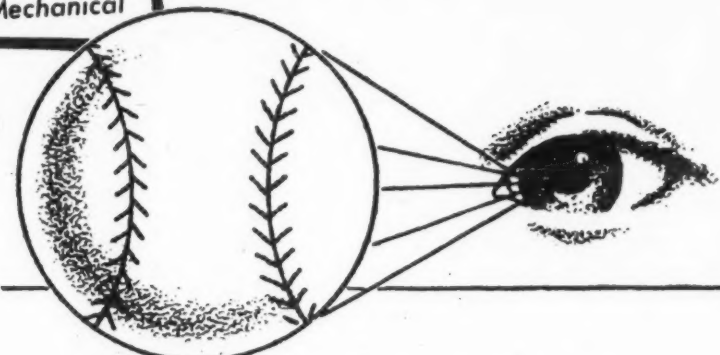
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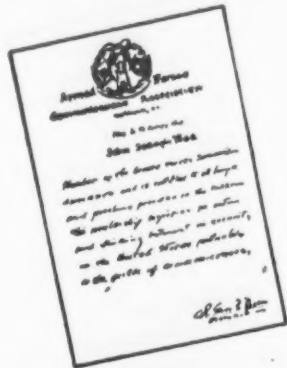
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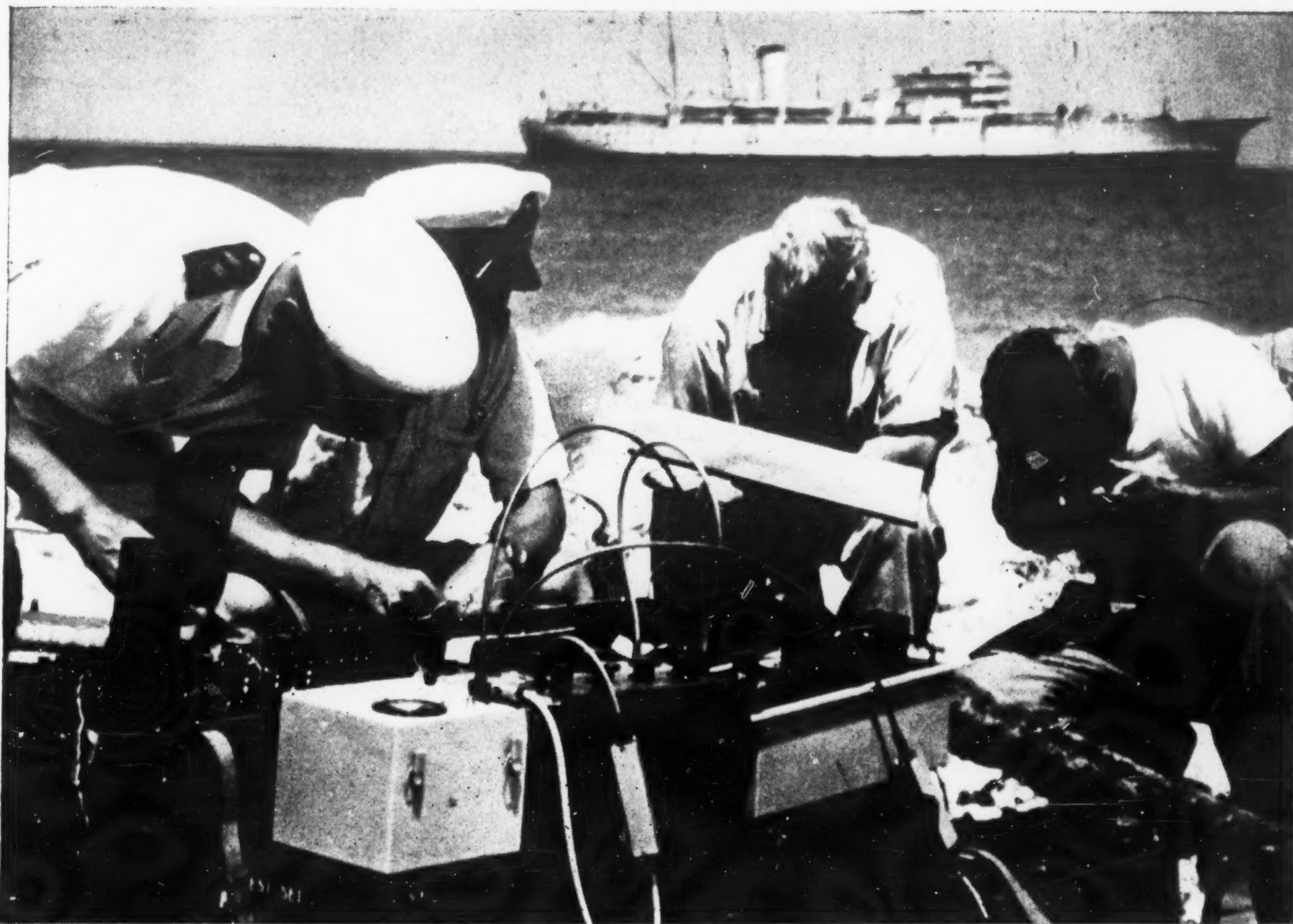
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Technicians testing Project Cocoa's submarine cable system somewhere in the Bahamas. The cable ship HMS Monarch, largest in the world, is in the background.

Project Cocoa

Project Cocoa is the name we gave to the submarine cable communication system for the Air Force's new guided missile testing range which stretches more than 1000 miles from Cape Canaveral in Florida through the Bahama Islands to Puerto Rico.

Missile flight data gathered over this king-size firing range is transmitted through the underwater cable system. It was planned and put in operation for the Air Research and Development Command of the Air Force by Western Electric, prime contractor on the project.

You hear quite a lot these days about the important part telephone technology plays in the latest defense weapons such as radar bombing and fire control systems and guided missiles. But Project Cocoa is a good example of the application of telephone technology in the less dramatic but equally important field of communications systems for the Armed Forces.

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